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NATIONAL MUSEUM

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The Australian Naturalist

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THE FIRST FIELD NATURALIST IN AUSTRALIA.

John William Lewin, Artist and Naturalist.

By WALTER W. FROGGATT, F.E.S., F.L.S.

Among the residents of Sydney in the first years of the last century was John William Lewin, an artist by profession, and a student of natural history. He has left two books on natural history and a number of pictures, as a record of his work. Copies of both these books and some of his pictures can be seen in the Mitchell Library, Sydney.

We can claim him as the first field naturalist in Australia, for he collected the insects in all stages of development, studied their life histories, noted their food plants, and made accurate coloured drawings from the living insects.

Lewin was born in London in 1770. His father, William Lewin, was an artist, and also a member of the Linnean Society of London. His elder brother, Thomas Lewin, was also an artist, and it was to the latter that Lewin sent his drawings from Sydney for publication.

He was well known in England because, before he left, the Duke of Portland, writing to Governor Hunter, February 6, 1798, said: "Mr. Lewin is a painter and drawer of natural history, and, being desirous of pursuing his studies in a country which cannot fail to improve that branch of knowledge, you will allow him the usual Government rations during his residence in the settlement." With these credentials, Lewin arrived in Sydney early in January, 1800, on board the H.M.S. Minerva.

Governor King attached him to an exploring expedition, under the leadership of Lieutenant James Grant, in 1801, which explored the Hunter River up to some miles east of where Singleton now stands. In November of the same year, he took passage in the "Norfolk" to the island of Tahiti; after some adventures, including a shipwreck, he returned to Sydney in the following year.

He now settled down in Parramatta, where he took an interest in public matters, and it is evident that it was while here that he first began to collect insects. When Governor Macquarie came into office he admired Lewin; he invited him to join the Government party across the Blue Mountains, over the road just opened up by Captain Cox.

In 1808 he advertised himself as a portrait and miniature painter, and later opened an academy of painting in Sydney, but evidently did not find much business. Macquarie after trying, without success, to have him made permanent Government artist, appointed him Coroner of Sydney in 1810, which position he occupied until the time of his death.

His first book was upon insects. The original copy is in the library of the Linnean Society of New South Wales. The title page is as follows: "Natural history of eighteen nondescript moths," with descriptions. Collected, engraved, and faithfully coloured after nature, by John William Lewin, New South Wales, Parramatta, 1804. The Linnean Society also has nine unpublished drawings by Lewin.

This original manuscript was sent to London for publication, but as none of the moths were scientifically named, or described, his brother consulted Dr. Smith, the president, and Alexander Macleay, the secretary of the Linnean Society.

They decided that it should be revised, and undertook to give the moths scientific names, and also name the food plants figured by Lewin. From Alexander Macleay, this MSS. copy came to Sir William Macleay, and was given by him to the Society.

The revised book was published as "Podromus Entomology. Natural History of Lepidopterous Insects of New South Wales," with the details on the manuscript plate previously given. "Printed by the author, and published from the hand of his brother, Thomas Lewin, No. 8, St. Agnes' Circus, Old Street Road, from whom it may be had. London, 1805." It is dedicated to the Right Honourable Lady Arden, who had encouraged Lewin in his work before he came to New South Wales.

In the preface he states that he has made some hundreds of similar drawings, so that the eighteen included in his book were only a small portion of his published work, and it would be interesting to find out what became of his MSS. plates.

Among the moths figured are five species of *Cryptophasa, Charagia lignivora,* our Puss moth (*Danima banksiae*), two hawk moths, and the vine moth, which even at that date had turned its attention to the introduced grape vine. The frontispiece, which is not mentioned in the text is *Delias nigrina,* the common white butterfly.

In 1822 a second edition was published under the same title page, except with the addition, "Illustrated with nineteen plates."

In 1808 his second book was published, "The Birds of New South Wales," containing 26 plates in colours, to which were attached popular names. It is worthy of note that he called the *Meliphagidae* "honey suckers," as they really are, and not "honey eaters." He figured the Regent Bird as the "King Honey Sucker"; the finches are grosbeaks, robins and wrens are warblers, but all his birds are easily recognised.

A second edition of this book appeared in 1813, without any alteration in plates or text.

In 1822 a third enlarged edition was published in London. In 1838, under the same title, a fourth edition appeared, printed on better paper, with more finished drawings. After the original title it states: "New and improved edition," to which is added a list of synonyms of each species, incorporating the labour of J. Gould, N. A. Vigors, T. Horsfield, M.D., and W. Swainson.

On his appointment to the office of Coroner (1810), he left Parramatta, and resided in Sydney. He lived in a two-storey house, situated on the eastern side of George Street, between Bathurst and Liverpool Streets, on a block of land running through to Pitt Street; after his death, it became an inn and was called the "Spotted Dog."

He died on the 27th August, 1819, aged 49. The Sydney Gazette of that date briefly records the event: "Died yesterday morning, after a severe illness. J. W. Lewin, Coroner, universally respected."

He was buried in the "Sandhills" Cemetery, later known as the Devonshire Cemetery.

Mr. A. G. Foster, in a paper, "The Sandhills," an historic cemetery, read before the Royal Historical Society, 1918, records the inscription on his tombstone: "Here rests the body of J. W. Lewin, Esq., Coroner, who departed his life on the 27th of August, 1819, after a short illness, which he bore with Christian fortitude, leaving a disconsolate widow and son to lament his loss; also felt by the few friends who knew him. In him the community has been deprived of an honest man, and the country of an eminent artist, in his line of natural history paintings, in which he excelled. He has gone, depending on the mercies of his God, through an atoning Saviour, Who writes our virtues on adamant, our vices on a wave. A friend has given this tribute to his memory."

DEEP SEA FISHES.

Abstract of lecture delivered by Gilbert P. Whitley on November 5:—

The address was illustrated by many beautiful lantern slides, of the rather grotesque denizens of the deep, whose characteristics and peculiarities were lucidly explained by the lecturer.

Mr. Whitley began by pointing out that there was a submarine platform called the Continental shelf, which extended along the New South Wales coast.

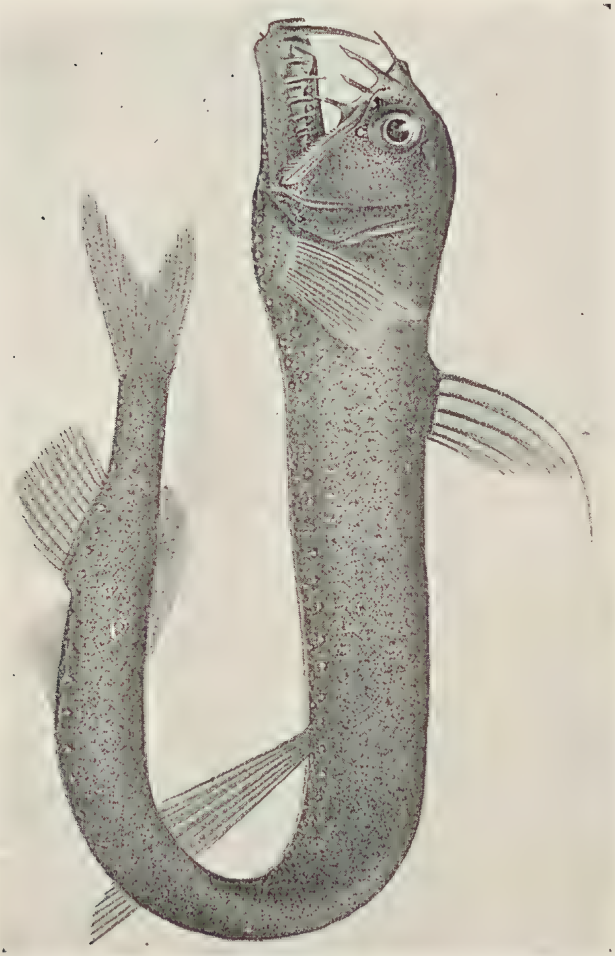
The trawlers caught most of the commercial fishes over this shelf in less than 100 fathoms of water. Beyond this zone the water became suddenly very deep, until at about 150 miles from Sydney it was over 2 miles in depth. Trawlers and trawled fishes were briefly discussed, and some curious sharks and other forms shown, the lecturer commenting on the food value of the former, which are quite palatable and well suited for canning, but are now returned to the sea as they have no market value. Slides depicting a "saw fish" and a "saw shark" were shown. The former is really a modified ray; the latter being a true shark.

Mr. Whitley then described his experiences on board the Royal Danish Research steamer "Dana," in the Tasman sea, where he saw living specimens of rare deep-sea animals captured. The "Dana" scientists were keenly on the lookout for the "glass eel" larvae of the Australian freshwater eel, the life history of which was briefly outlined.

A trio of "Jenny Hanivers" (which resembled anything but fishes) were the result of some ingenious fisherman's clever manipulations of certain portions of various small rays and skates prior to being dried.

A series of bizarre forms of fish life of the greatest depths, such as larvae with their eyes on long stalks, fishes with large eyes for piercing the deep-sea gloom, and others with marvellous rows of lights on their sides were shown. When brought to the surface, these fishes generally swelled up or burst, because of the sudden release from the pressure of the ocean abysses. One kind of fish had become practically blind and felt its way with long feeler-like fin-rays; another had a scent like a cucumber; still another employed bacteria to form headlights; but all, however strange, were obviously well fitted for their mysterious environment.

Little "hatchet" fishes with silvery bodies and rows of



THE VIPER FISH (*Chauliodus dannevigi*), showing the large eye, long teeth, and rows of light organs Drawing by late A. R. McCulloch.

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light organs, and "lantern" fishes with lights arranged in definite series on their scales were common and apparently swam in schools. Larger fish with big eyes and long teeth, such as the "Viper fish," were the enemies of the smaller species.

Amongst the most remarkable fishes were some eel-like forms, and the "Black Swallowers" or "Pelican Fishes" which had such elastic bodies that they could devour fishes as large or even larger than themselves.

An account of the deep-sea "angler" fishes was given. Some of these have been found with parasitic males attached to the skin, and fused to the flesh of the females, a unique phenomenon amongst vertebrate animals.

Mr. Whitley informed the meeting that the Museum authorities had taken steps to secure casts of many of the rare and curious fishes of the deep that have from time to time been dredged from ocean depths in various parts of the world, and he expressed a hope that they would be available to the public in the not far distant future.

THE FIG TREE LONGICORN BEETLE.

(*Monohammus fistulator* Germ).

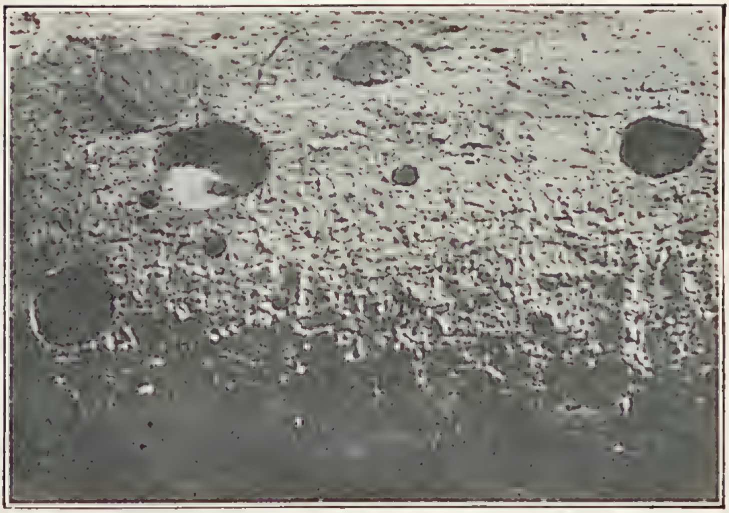
By Walter W. Froggatt, F.L.S., F.E.S.

This handsome silvery brown longicorn beetle is well known to entomologists. Under normal conditions most of the species of this genus use the indigenous fig trees as their host plant when depositing eggs.

Probably no healthy growing fig tree is suitable food for their larvae, but as soon as one becomes damaged by storm or decay occurs they are attracted to it and lay their eggs in the bark.

Most of the members of the genus *Monohammus* are tropical beetles, and there are several fine species to be found in the coastal forests of North Queensland. *M. fistulator* has a very wide range; it has been recorded from Kangaroo Island, off the coast of South Australia; is also found in Victoria, and is common in the coastal forests of New South Wales and Queensland. It is a pest of fig trees on Lord Howe Island, and is also found in the Philippine Islands. Besides having this extended range, it is an omnivorous feeder. I have bred it from the damaged stems of several species of *Ficus*, growing in Sydney parks and gardens, and have recorded it infesting the stems of grape vines and the main stems of passion vines in our orchards. I have also bred it from the dead branch of a red cedar obtained in the coastal forest.

It was *M. fistulator* which was responsible for the partial destruction of the ancient *Wistaria* covering the front of the historic mansion, Wentworth House, at Vaucluse. Apparently having bred in the giant Moreton Bay fig trees growing in the surrounding park, they later deposited their eggs in the bark of the Wistaria where the older stems had begun to decay, and their larvae spreading up



BARK OF FIGTREE, LORD HOWE ISLAND.

Showing curious exposed areas and the flight or exit holes of the adult beetles when they emerged the following year.

Photo: A R. McCulloch.

A FALLEN GIANT.

Showing the exit holes of the figtree Longicorn Beetle.

Photo: A. J. Vogan.

through all the main stems caused the plants to die back. The infested stems were cut away, and many hundreds of larvae and pupae were destroyed. After the removal of the infested wood a fresh growth was made.

A few years ago a number of the giant Moreton Bay fig trees on Lord Howe Island began to die back, probably from natural causes; their condition was soon found out by these longicorns, which, attracted to the decaying bark, deposited hundreds of eggs beneath its surface.

I am indebted to the late Allan McCulloch, of the Australian Museum, for the following description of the manner in which these eggs were deposited. The beetles placed their eggs singly on the surface of the rough bark and then cut a deep scar into the bark surrounding each egg, forming an irregular circle about an inch and a half in diameter. A larva upon hatching from the egg, would work its way through the bark into the sapwood beneath, while the circular shield of bark dried and dropped out, leaving a round pit and exposing the sapwood.

The accompanying photograph, showing these curious exposed areas and the flight or exit holes of the adult beetles when they emerged the following year was also given me by the late Mr. McCulloch.

I have also been fortunate in obtaining from my old friend, Mr. A. J. Vogan, who visited the island about the same time, a photograph taken by him of the final end of one of these forest giants, riddled with the exit holes of these beetles which had hastened its decay.

EMPEROR GUM MOTHS.

During August, 1929, Mr. Luke Gallard exhibited a fine series of Emperor Gum Moths which had been developed by him in order to determine the degree of colour variation in a given species.

In five examples of *Antheraea helena* the colour did not vary much, but in a series of twenty specimens of *Antheraea eucalypti* there were some six different hues.

Mr. Gallard stated that many people were of the opinion that the particular kind of food they ate was responsible for the colour variation, but he considered that much importance could not be placed upon this as a similar test with Silkworms, *Bombyx mori,* this season, had shown that where the larvae had the same food, the variation in colour was almost, if not quite, as marked.

SOME OBSERVATIONS MADE DURING 1928.

Following on the suggestion made by the President (Mr. D. G. Stead, March, 1928) for short notes as subject matter suitable for a Naturalists' Calendar, the following records of the occurrence of various insects have been received from some of our members.

For these notes to be of value, it is important that the scientific, as well as the popular name should be ascertained. It is hoped also that more members will forward their observations so that these may be published from time to time, as opportunity permits. The particular stage or form in which the example was observed should also be noted, and insect records would be of greater value if the hosts were included.

A comparison of the species now recorded with those which may occur during next February and March and other months of the year will be of great interest, and it is asked that all members aid in this work, which need not necessarily be confined to the Sydney district, nor to insects alone.

From R. A. Black.—Four "Blue Fanny" Butterflies (*Papilio sarpedon*) noticed flying about a Camphor Laurel at Five Dock on March 17.

From M. E. Gray.—During March, at Northbridge, Butterflies: *Papilio aegeus* (male), *Xenica acantha, Tisiphone abeona, Precis villida* (plentiful), *Heteronympha merope* (very plentiful), *Terias smilax.* At Marrickville: *Papilio anactus, P. sarpedon* (very plentiful), *Elodina angulipennis, Catopsilia pyranthe, C. pomona* (plentiful), *Terias smilax.* At Clifton Gardens: *Acraea andromacha, Xenica acantha.* Moths at Northbridge: *Phalaenoides glycine, Cruria donovani, Orgyia anartoides, Anthela acuta, Syntomis annulata.*

During April, at Marrickville: *Papilio sarpedon, P. anactus, Precis villida* (plentiful), *Hymenia (Zinckenia) fascialis* (plentiful), *Anthela (Darala) ocellata, Pyralis farinalis* (plentiful), *Antheraea eucalypti, Phytometra (Plusia) verticillata, Sericea spectans, Psilogramma casuarinae, Plutella maculipennis.*

From Miss H. McAnene, during February and March, at Marrickville.—*Antheraea* sp., eggs, larvae and cocoons on Pepper trees, Stringy bark and *Tristania* (plentiful). Sphingid larvae on privet and lilac bushes. *Phalaenoides* (vine moths), eggs and larvae on grape and Virginia creeper. *Danaida archippus* (Brown Wanderer), two adults. *Papilio aegeus* (Orchard butterfly), eggs and larvae on citrus leaves; adults on the wing. *Papilio sarpedon*

(Blue Fanny), eggs, larvae and pupae on leaves of Camphor Laurel. Lacewings and eggs on leaves of corn plant. Small cases of Psychid larvae on *Tristania* trees, and the larvae of a Limacodid feeding upon the leaves of Apricot, *Tristania* and turpentine trees.

From E. H. Zeck, February 10, 1928, at Ryde.—*Aulacophora olivieri,* on pumpkins and melons (very numerous), *Nezara viridula,* developing on beans, cosmos, clover and buttercups (all stages numerous); *Heliothis obsoleta,* adult and pupae in maize cobs; *Archimantis latistylus,* adults, nymphs and eggs; Bruchid beetles upon growing bean pods; *Nysius vinitor,* adults, in garden flowers; *Icerya purchasi,* fully developed females, with eggs on vine (sp. indet.).

PAPER NEST WASPS.

At the September meeting, Mr. Luke Gallard exhibited the nests of two species of "paper nest" wasps, viz.: *Polistes humilis,* Fab. (*Polistes tasmaniensis* Sauss.), and a species of *Ropalidia* (*Icāria*) which appeared to come closest to *R. gregaria,* Sauss.

The rounded nest of *P. humilis* measured over six inches in diameter. Mr. Gallard mentioned that these wasps exhibit a parental care for their larvae, which they supply with food from time to time when needed.

Six portions of the nest of *Ropalidia,* sp., varying from one to three inches in width and from four to seven inches in length were also exhibited. These were collected from a nest found under overhanging rock in the Kenthurst district.

Mr. Gallard stated that in this community the wasps must have numbered many hundreds, which, when he first observed them, were assembled around and amongst the cells of the nest like bees.

He was unable to collect more than about one-third of the nest, as all these wasps began to rise on the wing and he was forced to retreat.

BADGES.

Members may now obtain the Society's Badge from the Hon. Secretary (Mr. R. A. Black, Box 2178 L.L., G.P.O., Sydney) for 2/- (postage and package extra), or from the Hon. Assistant Secretary (Miss Dolce Dobbin, c/o Bank of New South Wales, William Street, Sydney).

AUSTRALIAN BOTANICAL NOMENCLATURE.

By Raleigh A. Black.

In a previous article (1), attention was drawn to the forthcoming International Botanical Congress, which it is proposed to hold at Cambridge, England, in 1930.

This Congress may be likened to an International Parliament, functioning upon a Constitution (2) drawn up by taxonomic and other botanists throughout the world.

Article one of the International rules of Botanical Nomenclature predicates the necessity for such an institution, namely, "Natural history can make no progress without a regular system of nomenclature, which is recognised and used by the great majority of naturalists in all countries."

Maiden (3) correctly said that botanists are bound by the laws of this Congress, as one is by those of his own country; but Ewart (4) took exception to this opinion. Prior to these congressional enactments botanical nomenclature was in a chaotic condition, resultant upon each country being a law unto itself, although, strictly speaking, there was a sad want of unanimity of views upon certain questions in a given country.

In past years, Australian botanists have not been in close personal touch with the thought and doings of botanical leaders of the Northern Hemisphere, which is the Fatherland of Botanical Science. The late Mr. Maiden attended the Paris Botanical Congress of 1900, but at the all-important Congress of Vienna, in 1905, no Australian botanist was present, and it is believed the same is true of the Brussels Conference of 1910 (5), and it is certainly true of the last International Botanical Congress, held at Ithaca, U.S.A.

The committee that was appointed at the last Congress, held at Ithaca, U.S.A., in August, 1926, has been busy preparing matter for the 1930 Congress, and, as regards Australia, Mr. J. M. Black, the secretary of the local committee, has supplied me with a list of the decisions of the Australian committee with reference to names which should be conserved and those which should be rejected. These are shown below:—

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(1) The Aust. Nat., vol. 7, part 7, p. 141.

(2) Reg. Intern. de la Nomen. Bot. Jena, 1912.

(3) Jour. Roy. Soc. N.S. Wales, vol. xl., 1906, p. 74.

(4) Proc. Roy. Soc. Victoria, 20 (N.S.), pt. ii., 1907.

(5) J. M. Black, Aust. Bot. Nomen., A. A. for Adv. of Science, vol. 17, pp. 742-745, 1924.

NOMINA CONSERVANDA.	*NOMINA REJICIENDA.*
ORCHIDACEAE.	
Corysanthes, R. Br. (1810).	*Corybas,* Salisb. (1807).
Goodyera, R. Br. (1813).	*Epipactis,* Boehm. (1760). *Peramium,* Salisb. (1812).
POLYGONACEAE.	
Muhlenbeckia, Meisn. (1840).	*Calacinum,* Rafin. (1836). *Karkinetron,* Rafin. (1836). *Sarcogonum,* G. Don. (1839).
LEGUMINOSAE.	
Dichrostachys, Wight. (1834).	*Cailliea,* Guillem. et Perr. (1833).
CELASTRACEAE.	
Denhamia, Meisn. (1837).	*Leucocarpum,* A. Rich. (1834).
UMBELLIFERAE.	
Oreomyrrhis, Endl. (1839).	*Caldasia,* Lag. (1821).
EPACRIDACEAE.	
Leucopogon, R. Br. (1810).	*Perojoa,* Car. (1797).
STYLIDIACEAE.	
Stylidium, Swartz. (1805).	*Stylidium,* Lour. (1790). in *Cornaceae.*
COMPOSITAE.	
Angranthus, Wendl. (1809).	*Siloxerus,* Labill. (1806).
Olearia, Moench. (1802).	*Shawia,* Forst. et f. (1776).
Cassinia, R. Br. (1817).	*Cassinia,* R. Br. (1813).

As regards other generic names which have the right of priority, but which have been replaced by later names in several important works dealing with the Australian flora, the committee decided to support the following earlier names in case of any attempt being made at the Congress to displace them:—

Themeda, Forsk. (1775), as against *Anthistiria,* L. f. (1779).—*Gramineae.*

Stenophyllus, Rafin. (1825), as against *Bulbostylis* (Kunth.), C. B. Clarke (1893).—*Cyperaceae.*

Stemona, Loun. (1790), as against *Roxburghia,* Banks (1795).—*Stemonaceae.*

Lomandra, Labill. (1804), as against *Xerotes,* R. Br. (1810).—*Liliaceae.*

Corymborchis, Thou. (1809), as against *Corymbis,* Thou. (1822).—*Orchidaceae.*

Lindernia, All. (1762-65), as against *Vandellia,* L. (1767).—*Scrophulariaceae.*

A RAMBLE THROUGH RODRIGUEZ PASS.

By M. E. GRAY.

Rodriguez Pass, Blackheath, begins at the foot of the Bridal Veil Falls, better known as "Govett's Leap," although one must negotiate the track down the cliff face from Breakfast Rock in order to reach the foot of the Falls.

Govett's Leap, from the foot of the falls, is one of the most fascinating sights imaginable, and one that is well worth the climb down the cliff pass to see. Words cannot describe the exquisite beauty of the veil of water mist, as it sways and billows here and there at the vagaries of the air currents through which it passes on its drop of 520 feet through space on to the huge boulders at the bottom.

Vegetation is very varied. Tiny ferns nestle close to the cliff faces, whilst giant Sassafrass and Myrtles compete one with the other in the race skywards, which means light and life to the winner. Sundews cling to the damp cliff faces wherever a root hold can be obtained, and tall tree ferns abound in patches all along the Pass.

Birds were few, but some of the smaller of them were utterly fearless of man, and perched within arm's length of one. The variety of insect life did not appear to be great. The most conspicuous form observed on our hurried sojourn was *Heteronympha mirifica,* Butl., and next in order of numbers were the "Common Browns," *H. merope,* Fab., and a smaller cousin, *H. solandri,* Waterh. The only beetles (with the exception of water beetles) met with were *Anoplognathus viridi-aeneus,* Don. They were very numerous on the heights, but only an odd one appeared here and there in the valley. I noticed a moth, new to me, resting on a rock, and on looking closely I discovered that it was minus the abdomen, although it made a valiant attempt to escape when I tried to secure it.

Lizards were fairly plentiful, and some of the larger of them crossed the busy stream in a succession of leaps from rock to rock. The smaller "micky" lizards ("Thorny devils") were quite tame and easily captured.

In the stream numbers of water beetles (*Dytiscidae*) were disporting, whilst an occasional "lobby" (crayfish) of bright scarlet hue leisurely ambled over the rocky bottom. I thought it rather peculiar that all the cray fish in the streams of the Grose Valley were bright red in colour, whilst those frequenting the streams of the Kanimbla Valley were slate blue.

After "The Junction" is passed the valley opens out and "gums" predominate. The stream hereabouts resolves itself into a series of pools where, if time permits, one may indulge in the luxury of a swim in ice cold water.

When the valley closes in again the stiff climbing begins, but, as the "Valley of the Waterfalls" is reached shortly afterwards, one almost forgets the arduous climb in admiring the beauty that unfolds itself. Fall after fall is met with, each one with a charm all its own; one of the most imposing is rather difficult to approach and is rarely visited, although it is only a "stone's throw" from the Pass.

One of the most beautiful falls in the Blue Mountains (Pope's Falls) has been almost blocked up by a huge fall of rock from the cliff top, about 1,000 feet above.

Just before one reaches Beauchamp Falls, the recently discovered "steam jets" are to be seen. We did not see the "steam," but felt the moist heat emanating from the holes.

The odour strongly suggested spontaneous combustion from decaying vegetable matter, but I understand that the geological theory for the phenomenon is "burning coal."

Rodriguez Pass ends about a quarter of a mile above Beauchamp Falls, and the easiest way back to civilisation is via the Fernery and Evan's Lookout.

EXCURSION TO THE ZOOLOGICAL GARDENS.

(From Notes by R. A. Black.)

A very enjoyable and highly instructive visit was made by members of the Naturalists' Society of N.S.W. to the Gardens at Taronga Park, on Saturday afternoon, June 1, 1929. The Director, Mr. A. S. Le Souef, very kindly met members at the Zoo wharf, and then led them through the Park, which locates the magnificent collection of animals.

Our attention was drawn to the "Cheese Tree," *Phyllanthus Ferdinandi,* named in honour of the late Baron von Mueller, for many years Government Botanist of Victoria.

Mr. Le Souef spoke of its value as an ornamental and shade tree, as well as a wind break, and he considered that it was one of the best ornamental trees suited to the County of Cumberland.

The Polar bears were then visited; altogether these bears have given birth to twenty young, but only one has survived; principally due to wider experience and knowledge gained in their breeding. The absence of vitamines in their food was stated to be the cause of their deaths, but now that sperm oil, fish and cod-liver oil are provided, no more difficulty in rearing them in captivity is expected.

Numbers of the Swamp Mahogany (*Eucalyptus robusta*) were growing within the grounds, in anything but swampy conditions. This fact might lead one to criticise the popular name of this tree.

The leader pointed out that the "Smooth-barked Apple," *Angophora lanceolata,* was dying in large numbers owing to the removal of the dense undergrowth.

The Malay bear was next inspected. This bear is distinguished by a large yellow patch on the chest, the rest of its short, close coat being black.

Mr. Le Souef said an experiment was carried out to ascertain which Eucalypt the Native Bear or Koala had a preference for. He stated that fifteen had been given their liberty, but apart from noticing that they had liked the leaves of *Eucalyptus punctata,* the experiment was not conclusive as the bears ultimately disappeared.

When viewing the Kangaroos and Wallabies, the leader said that great slaughter was made of Bennett's Wallaby, as its skin was in such demand for rugs, coats, etc., that thousands of these animals were killed annually for that purpose.

We now reached those remarkable birds, the Flamingoes. Their nest is made of mud, often with its foundation in some fifteen inches of water and rising from six to eight inches above the water surface level. The diameter at the top is about fifteen inches. By the time the eggs have hatched the water has disappeared.

We were now shown a pretty corner of the grounds which is being set apart for birds, which like the shade and stillness of the bush. Later a "cedar wattle" (*Acacia elata*) was greatly admired. It is sometimes called the "Pepper-leaved Wattle," as it somewhat resembles the imported pepper-tree (*Schinus*).

The New Guinea Cassowary was next examined. It is recorded that both Cassowary and Emu possess, when adult, one character shown by no other living adult bird; they have what may be called double feathers, each feather possessing two shafts of equal length.

A very interesting link with the past was the Mongolian wild horse, which it was explained was contemporaneous with the cave-man and mastodon. We were greatly interested in our leader's description of the twelve-wired Bird of Paradise, which inhabits the Island of Salawatti and north-western New Guinea.

Numerous other animals, birds and trees were inspected, about all of which Mr. Le Souef had much to tell us.

NATURALISTS' SOCIETY OF NEW SOUTH WALES.

Abstract of Proceedings for the months of September, October, November, and December, 1929:—

Lectures.

"Parrots of Australia," by Mr. E. Gostelow, illustrated by a particularly fine collection of paintings by himself.

"Some Sea Birds," by Mr. A. F. Basset Hull, illustrated by lantern slides.

"Deep Sea Fishes," by Mr. G. P. Whitley, Ichthyologist to the Australian Museum, illustrated by lantern slides.

"Members' Evening."—The following members taking part: Messrs. Noel Burnet, P. E. B. Barnett, David G. Stead, W. W. Froggatt, and M. E. Gray. These members illustrated their remarks with lantern slides, which were of a high order and referred to the Koala, birds, fishes, insects and geological views.

Excursions.

Outings of a very pleasant nature were made to Dalrymple Forest, near Turramurra, "Kewita," Somersby, via Gosford, Clontarf Pleasure Grounds, Middle Harbour.

Exhibitions of Specimens.

Mr. A. E. Watson.—A section of a root, probably a Conifer, petrified into carbonate of lime. This was taken from the sandstone adjacent to a coal seam in a Wallsend mine.

A fragment of "natural coke," taken from a coal mine, Wallsend. A volcanic dyke had forced its way into the coal seam, and the heat had coked the adjacent coal under pressure.

A stalactite taken from a overhanging rock in National Park, indicating the presence of carbonate of lime in the superimposed strata of sandstone.

Mr. Luke Gallard.—A fine series of specimens, including a box of Emperor gum moths (*Antheraea*) which he had bred out this season with a view to testing the variation in colour of the same species; also two colonies of *Vespidae* or paper nest wasps.

Mrs. S. Howell.—A cushion cover, depicting an opossum painted by Mrs. Felton, of Artarmon; also specimen of *Emmenospermum alphitonioides,* Muell., commonly known as Bonewood. A good account is given of this tree in Maiden's "Forest Flora of New South Wales." This specimen of Bonewood was forwarded to Mrs. Howell by Mr. E. P. Braithwaite, of Wyong.

Mr. Albert Booth.—Specimen of *Peperomia reflexa* of the order *Piperaceae,* determined by Dr. J. McLuckie, of the Sydney University, and collected by Mr. Booth in a freshwater creek near Mangrove Mountain.

Mr. John Powell.—Specimen of *Mimosa sensitiva* collected by him in Fiji. Its principal character is that when it is touched, if only very slightly, the leaf immediately closes up. It is found all over the Fiji group of islands, growing on banks and open country.

Mr. C. Gowans.—Fruit and leaves of the Quondong, *Fusanus acuminatus.*

Mr. G. G. Park.—Specimen of the Pine-leaved Bottlebrush, *Callistemon pinifolius,* and paintings of *Comespermum cricinum, Boronia serrulata,* and *Telopea speciosissima.*

Mr. F. J. Ludowici.—Specimen of the Smoke Bush of Western Australia, *Conospermum triplinervum.*

Prof. A. J. Abbott.—Seed pods of *Lambertia formosa,* gathered at Wentworth Falls.

Mr. E. Gostelow.—A collection of paintings of birds executed by himself, including Chats, Emu, Wrens, Diamond birds, and Fairy Wrens.

Mr. J. W. Hawley.—*Martiniopsis.* Fossil bivalve mollusc from the Maitland district. The shell has fretted away, leaving the mollusc in a mummified state. It was stated by Dr. Woolnough to be a perfect specimen, somewhat rare and allied to the cockle family.

Niotha comtessi, Iredale.—From Sydney Harbour. Of this species six have been found, and this is one of the six. There is another species in Queensland.

Aboriginal Flint Tomahawk, or Hatchet, and a small flat grinding stone used to grind the edge of the axe, from Tibooburra, North West, N.S.W., near South Australian border.

Opalised petrified wood from Milparinka, N.S.W. It is very hard, silicious and is sometimes made into trinkets and brooches, as it will take a beautiful polish.

A piece of fossilised *Argillaceous conifer* from Wollongong, showing a knot on the side.

New Members.

Mr. F. Mills, 13 Penshurst Street. Willoughby; Mrs. G. Russell, 321 Bondi Road, Bondi; Miss Metcalf, St. Catherine School, Albion Street, Waverley; Miss Catherine Sinclair, c/o Mr. Cunliffe Jones, 14 Burlington Road, Homebush; Mr. Robert Harris, 161 Frederick Street, Ashfield; Mr. F. E. Burbury, Launceston, Tasmania.

Treasurer's Statement.

The Hon. Treasurer (Mr. John Powell) reported that up to the 4th November, 1929, there was a credit balance of £94/9/4.

Free Exchange of Plants or Seeds.

Mr. Edwin Ashby, of Blackwood, via Adelaide, South Australia, is willing to exchange plants or seeds with members.

Miss T. Y. Harris, of 464 Thomas Street, Broken Hill, in writing to the Hon. Secretary, said: "Here one may find a great assortment of native plants from all States of Australia. Many of these are in a flourishing condition, and Mr. Ashby, a most ardent lover of plants, is anxious to add to his collection. I thought, perhaps, you would be good enough to bring before your members a suggestion from Mr. Ashby, namely, that he exchange seeds and young plants from his garden for local material."

Those who intend to make exchanges had better communicate with Mr. Ashby first, and notify him of the names of plants or seeds they would be able to send him. This would save undue duplication.

Exhibits by Mr. Stead.

At the December meeting, the president (Mr. David G. Stead) exhibited a number of lantern slides of miscellaneous subjects, among which were:—

Development of the Common Oyster (*Ostrea cucullata*), illustrating all phases from the egg to the bivalvular "spat"; also deposits of young oysters on timber laid out for the purpose in oyster culture. Mr. Stead explained that in our common oyster the sexes are separate and not united in the one individual as in the Mud Oyster (*O. edulis* var.).

A remarkable photo of "crab mountains" on the foreshores of a Malayan island, illustrating the way in which the shore crabs act as agents in the elevation of the shallow coastline, building up the mud into sharp ridges just reaching above tide limits and hastening the growth of Mangroves, and, later, swamp jungles. Mr. Stead mentioned how, during his sojourn in Malayan countries, he had often seen that the crabs had come up through the middle of roads bordering the muddy shoreline overnight and had erected little mounds there.

An illustration of the great Mangrove Crab (*Scylla serrata*) which is very abundant on our tropical coasts (while occurring not uncommonly in the New South Wales estuaries) and is destined, in Mr. Stead's opinion, to be of great economic importance in Australian fisheries.

The great Dusky Bat Fish (*Platax*) which is almost orbicular and reaches a depth of about two feet. Mr. Stead mentioned how, on one occasion, when anchored in deep water in the Great Redang Islands, off the coast of Trengganu (Malay Peninsula), several of these large fishes had been seen to swim near to the vessel in several fathoms of water. No ordinary bait was available and a banana (of which plenty were available for the Malay curries) was tried, with great success, a large Bat Fish being immediately hooked.

A photo of a stone fish-ladder which Mr. Stead had been instrumental in having placed in the Jenolan River some years ago to enable the spawning trout (Rainbow) to climb up into the dam. Since then the dam has been filled with rubble and sand from repeated storms. But many trout were caught and stripped of their ova at the head of this ladder.

GEOLOGICAL EXCURSION TO BONDI.

About thirty members attended the excursion to Bondi, on Saturday, July 27th, where, under the leadership of Miss H. Drummond, B.Sc., a very interesting and instructive afternoon was spent.

The leader explained the various points of interest and informed members that Ben Buckler, the headland to the N.E. of Bondi was once separated from the mainland by the sea, which made another entrance to Sydney Harbour, between Bondi Beach and Rose Bay. This area is now filled in by sand.

The sandstone of Ben Buckler has been intruded by a volcanic neck and by two volcanic dykes. The heat and hot water from these have caused the sandstone in the vicinity of the neck to become changed to a poor quartzite which, as it cooled, contracted and cracks, developed, resulting in well marked prismatic jointing. One side of the neck is still preserved in the cliff, and a small islet of basalt just off the shore is all that remains of the core or plug of the old volcano.

The basalt in the dykes has mostly been eroded, as it is easily rotted by rain water. A wide open cleft or chine is left when the dyke material is removed.

The sandstones in the cliffs on either side of this disturbed area show the ordinary sedimentary rock structures such as stratification and cross-bedding, and also the effect of atmospheric and marine erosion.

At the conclusion of the excursion a vote of thanks was accorded to Miss Drummond.

EXCURSION TO CLONTARF.

On Saturday, November 30, the monthly excursion was held at Clontarf. The members met at the Spit, Middle Harbour, and crossed to Clontarf by launch.

Under the leadership of Mr. A. E. Watson, and with Mr. G. G. Park as guide, the party made their way to Castle Rock, and then proceeded along the foreshores, where the beauties of Middle Harbour were enhanced by many sailing boats racing in the fresh southerly breeze.

Many of the interesting rock formations were explained by Mr. M. M. Lumsdaine.

The return to Clontarf was made via an easy bush track, where many indigenous plants, including *Angophora cordifolia* were seen at their best.

REVIEW.

The second number of the journal of the Geographical Society of N.S.W. (*Australian Geographer,* Vol. 1, pt. 2), has made its appearance. Its 104 pages contain much that is of great importance to both naturalists and general members of the community, while the journal is well illustrated.

In a paper, based on his last Presidential address before the Geographical Society, Mr. D. G. Stead presents a very valuable contribution on "The Development of Northern Australia, with special reference to Australia's Tropical Fisheries."

The lines on which this development may proceed are indicated, many illustrations being furnished.

Miss Catherine Doyle has an excellent paper on the "Localisation of Industry in Coastal Districts of N.S.W." This will be of great value to anyone interested, either in the geological origin of our coastal districts, or the industrial and agricultural developments which have taken place there.

Many other items of value and interest are noted in this issue.

Members of the Naturalists' Society may not be aware that the Geographical Society only started in 1927, but already has a membership of about 275; the subscription being 10/- for ordinary members, and 5/- for students (including student teachers) per annum. The price of the journal to non-members is 2/6, and may be obtained from the Hon. Secretary of that Society, 17 Bligh Street, Sydney.—Ed.

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HOW TO KEEP AN AQUARIUM.

By David G. Stead.

One is asked perennially all sorts of questions relating to aquarium keeping. The following notes prepared some time since for the Aquarium Society may be of use to our members. Several firms sell fish, water plants, etc.

The first and a very important consideration leading to success is the aquarium itself. It should be of such construction and of such proportions as will enable the owner to offer the fish and the plants the conditions which are needed by both.

Rectangular tanks offer the best opportunities, and the height of a tank must not be greater than the width. For a small aquarium, good proportions are: 15 inches long, 10 inches wide, and 10 inches deep; for a larger size, 18 x 10 x 11. An inch or two of grit will reduce the depth of the water to that of the width of the tank. In larger tanks, 2 or even 3 feet long, the width should not exceed 12 inches, and the whole depth should not be greater than 12 inches, as all aquarium fish will do best in water not deeper than 10 inches.

Fish-tanks constructed of a metal frame, into which the glass has been securely cemented, are the most serviceable, but care must be exercised that no water or grit be allowed to come into contact with the metal. Should the bottom of such a tank be of metal, it should be covered with cement or a piece of glass securely cemented over the metal.

Twenty-six ounce glass should be used for all frames up to 18 inches long; plate glass for all larger sizes.

All new fish-tanks must be well soaked and receive several changes of water before they are to be established.

Round fish-bowls should never be used, as they produce conditions in every way unsuitable for the maintaining of fish. They are, in fact, merely torture chambers.

Most failures are due to faulty proportioned tanks, to over-populating, and to over-feeding. Over-feeding means giving the fish more food than they will eat. Unconsumed food will decay and putrefy the water, with the result that the fish will suffocate. All untouched food, as well as all decaying matter, must therefore be removed with an aquarium syphon.

All fish breathe and air is as necessary for fish as it is for life on land. Land forms inhale oxygen direct from the atmosphere, whereas fish absorb the oxygen which is dissolved in the water as it passes over the gills, and they can only live as long as the water contains oxygen. Therefore, the quantity of the water in which fish are kept must be sufficient to enable it to store the amount of oxygen needed by the fish. This is most important.

Plants on land, as well as in water, generate oxygen, and, as they will only do so in good daylight, an aquarium must be placed into a position where it will receive good daylight without being exposed to the direct rays of the sun. To keep up a continuous supply of oxygen an aquarium must contain plenty of healthy, well-growing plants.

The plants should be rooted in equal proportions of sand and fine shell-grit which has been thoroughly washed.

In a well-set-up aquarium the water need never be changed, and should not be changed. Water is only added to make up for the loss caused by evaporation. The plants keep the water pure; they absorb the dissolved excrement of the fish, as well as the carbon-dioxide given off by the fish in respiration, converting these into carbon and oxygen. The carbon is retained by the plants for their own use, and they liberate the oxygen into the water for the use of the fish. Accordingly an aquarium should only contain as many fish as the plants can supply with oxygen.

Should the water need to be changed, the added water should be of the same temperature as that taken away.

Regular feeding with nutritious food is important, and the fish should at intervals receive a change of diet. The more living food given the better.

If an aquarium is of the right dimensions, contains sufficient water and plants, and has a good position in regard to light, it will almost look after itself. The only attention required will be the feeding of the fish. Failure will then only be due to faulty feeding and the permitting of decaying food to remain in the aquarium.

THE WORONORA RIVER.

From a Naturalist's Viewpoint.

By M. E. Gray.

The Woronora River beyond Engadine is a veritable naturalist's paradise, worthy of far more attention from nature lovers and students than it receives; soon it will be too late, for already much of the land is marked out into blocks for sub-division.

As it is at present, at all seasons of the year the botanist may revel in a glory of trees and flowering plants, ferns, etc., and especially so during spring and early summer.

Here the giant lily (*Doryanthes excelsa*) raises its glorious crimson head high in the air, and a shapely "wax plant" (*Eriostemon lanceolatus*) spreads a mass of delicate blossoms that are excelled nowhere else in the vicinity of Sydney, whilst all round is an infinite variety of fascinating flowers. The Waratah (*Telopea speciosissima*) may still be studied in its natural habitat. Red Spider-flowers (*Grevillea punicea*) here appear larger and more brilliant than one generally sees them, and Red Bottle Brushes (*Callistemon lanceolatus*) also attain a larger size along the rocky river banks. The hardy "Burrawongs" (*Macrozamia*) are found on the hillsides.

For the bird lover there is the charming little rufous rock warbler (*Origma rubricata*), a denizen of the Hawkesbury sandstone region, so trusting and fearless that it will hop up and eat the crumbs at one's feet if one will only remain still. Whip-birds (*Psophodes crepitans*) Pallid Cuckoos (*Cuculus pallidus*), and Thrushes (*Turdus lunulata*) will entertain one with their songs, and the latter will even compete with one if one can only tolerably imitate its song.

The geologist will doubtless find plenty of interest in the caves with their miniature stalactites and honeycombed grottoes, and in the volcanic dyke.

The entomologist may collect a variety of insect life, both in and about the stream, where the larvae of various dragon-flies are to be seen. Beetles, butterflies, dragonflies, cicadas, etc., abound.

In the stream itself one may watch the struggle for existence being enacted. A school of "Sydney Minnows" (*Galaxias attenuata*) sport themselves in the sparkling sun-lit waters, heedless of a half-grown gudgeon (*Philypnodon grandiceps*) that lurks in a cleft on the rocky bottom. Suddenly out darts the gudgeon to retire an instant later with a silvery minnow held in its capacious jaws only to fall a victim to a larger member of its own kind a moment later.

The most prominent water plant is the "eel or ribbon grass" (*Vallisneria spiralis*) which is common in most parts of the stream and in some of the pools.

Care-free life by the dear old river—
  Riot of flowers and the wild bird's song;
Musical breeze in the leaves a-quiver—
  There would I loiter my whole life long.

NOTES ON *CYSTOSOMA SAUNDERSI.*

By W. W. Froggatt.

A specimen of the "Bladder Cicada," *Cystosoma saundersi*, was sent to me from Gosford, where Mr. A. A. Gollan caught it in December.

Westwood, in his original description, described this Cicada as reddish-brown, which is somewhat remarkable, as, though there are reddish-brown specimens, they are very rare, and I have only once seen one that was not bright green. Dr. Bennett, in his "Gatherings of a Naturalist," gives an interesting account of this insect, which he calls the "Orange Locust," and says that he only found it in Scott's orchard, on Ash Island, Hunter River. He never found or heard it in the forest, and, as far as I know, nothing is known of its life-history or food plant. Bennett says it appears in September. Scott's orchard vanished many years ago, and with it the Orange Cicada. My first specimens came from Armidale, where they were found only in the sweet briar bushes. Next I found it on the Tweed River, where it lived in the tangled lantana brushes. All these food plants are introduced.

At the February meeting, Mr. L. Gallard exhibited a tube in which were about twenty-five clusters or rafts of mosquito eggs. These had hatched, and the tube was literally full of young larvae, numbering considerably over one thousand. The eggs were all taken from a vessel, less than eighteen inches in diameter, and were exhibited to give members an idea of how many of these tormenting insects may be bred by leaving stagnant water about their home. The eggs were dark, elongate, and were placed on end, and closely packed. It is not at all uncommon for a number of these egg rafts to be blown together, thus forming a mass.

HINTS FOR COLLECTORS OF FISHES.

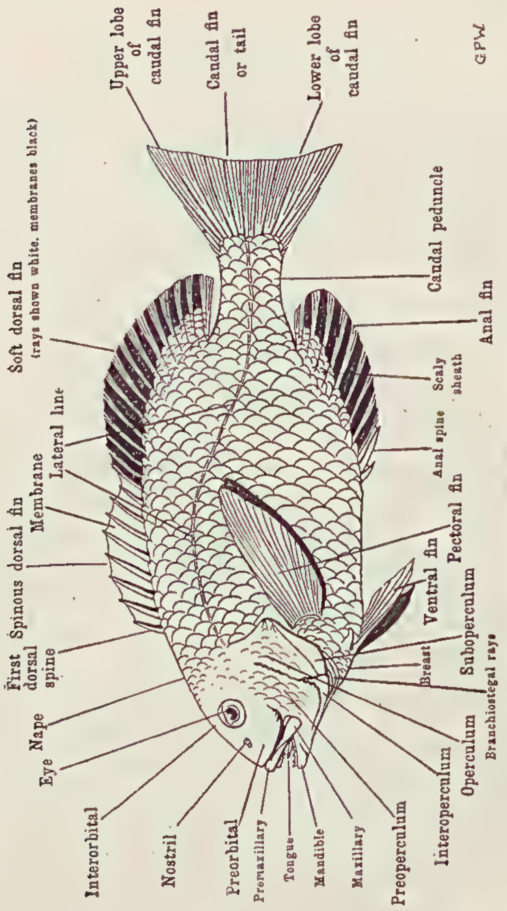
By G. P. Whitley.

The collector should secure at least one specimen of every species of fish he encounters, no matter how common it appears to be. Showy or large fishes are generally of less scientific importance than small inconspicuously coloured forms. Series of specimens showing the changes which occur with growth and any fresh water fishes are particularly desirable. Beaches should be scanned for stranded specimens, whilst clumps of coral, large sponges or other marine growths broken up and boulders overturned between tide marks are fruitful sources of material. Provided no legal restrictions forbid, fishes in rock-pools may be poisoned by mixing chloride of lime with the water. Dredges, trawls, and tow-nets are invaluable for marine collecting.

Notes on the food or habits of fishes are always useful, and the life-colours of their various parts (as shown in the diagram) should be carefully noted, or, better, a coloured drawing made. Any parasites or embryological specimens found in fishes should be preserved, with labels explaining the circumstances under which they were obtained. The gills, integument, and internal organs of fishes are often parasitised by worms, crustacea, etc.

Fishes may be fixed by placing them in a solution of formalin prepared by dissolving commercial formalin in fresh, or even sea water in the proportion of eight fluid ounces of formalin to one gallon of water, roughly twenty parts of water to one of formalin. They may be left in formalin for months, but should not be preserved in it indefinitely, as the bones, spines, and scales become soft. Spirits of wine (seventy-five per cent. alcohol) is the best permanent preservative known, being superior to methylated spirits. Fixatives and preservatives should always be kept in air-tight receptacles; milk-cans are useful for larger specimens, and bottles or glass tubes for smaller ones.

When possible, fishes should be dropped alive into formalin, as they then quickly die with fins extended. Those which have been dead for some time before being collected should be washed and soaked in water until the fin-membranes may be extended and the tissues lose most of their shrivelled appearance. A slit in one side of the body of larger specimens should be made, so that the internal organs may be reached by the preservative, or formalin should be injected with a syringe through the anus. After fixing in this manner, each fish should be wrapped in



EXTERNAL PARTS OF A FISH.

muslin for protection, with a strong paper label upon which its name, place of capture, and collector's name should be noted in Indian ink or soft lead pencil. Tin labels stamped with numbers may be sewn or tied securely to the specimens and data concerning them entered in a notebook against corresponding numbers. Large and small fishes should be kept apart as much as possible, whilst specimens should never be crowded into a bottle or can. They may be consigned, packed in plenty of rags, which have been soaked in preservative to keep them moist, in an air-tight tin, such as a soldered kerosene tin.

Very large specimens may be skinned and the skin, with head intact, placed in preservative; or the viscera may be removed and the backbone divided into sections so that the specimen may be folded to fit its receptacle. If spirits or formalin cannot be obtained, strong brine, with a little alum added, can be used for pickling fishes. They should be left to soak for several days before being packed for transit. Fishes may also be kept for a time by being frozen in ice or packed in a mixture of ice and salt.

EVOLUTION OF TOPOGRAPHY OF THE SYDNEY DISTRICT.

Abstract of lecture delivered by Miss H. R. Drummond, B.Sc., on February 4.

The lecturer began by pointing out that coastal elevations and subsidences are continually taking place all over the world to a greater or lesser degree, and explained that all the great mountain ranges of the world have been raised in recent geological times. Sydney district had its elevation at the same time as the Alps and other mighty ranges. Portions of Sydney and the country west of Sydney extending to a little beyond Penrith were not affected by this upraising, and so formed a peneplain.

River development was dealt with, and we learned that rivers are forever striving to cut down to base level, but that uplifts often gave old rivers the appearance of new rivers, resulting in deep river valleys. New rivers have very steep sides and run rapidly, carrying boulders along their course, which, aided by weather conditions, cut and erode a path to the sea.

Old rivers, on the other hand, run slowly, and do very little work in the way of shifting material. Cook's River, George's River, Parramatta and Lane Cove Rivers, which are south and west from Sydney are old rivers, whilst the rivers and creeks north of Sydney to Broken Bay and south of Botany Bay are young rivers.

There are two kinds of uplift—one by convolutions of the earth, resulting in the folding of the uplifted rock masses, and the other by horizontal uplift, in which process the rock strata remains level. The elevations in the Sydney district are of the latter class.

After this uplift there was an apparent subsidence of two hundred feet, due, no doubt, to the sea waters having risen to that extent owing to the melting of the ice at the end of the last great Ice Age. At a later period there was another uplift of some ten feet, indicated by the exposed rock platforms that occur along our coast.

Botany Bay, being practically unaffected by the uplift, remained a shallow sheet of water, devoid, for the most part, of any scenic beauty.

Sydney Harbour was affected partially more so on the north arm than on the southern shores.

Farther north, at the outlet of the Hawkesbury River, the uplift was more intense, resulting in the scenic wonder now known as Broken Bay.

Bondi and Manly were low spots, probably covered by shallow waters prior to the ten feet uplift. After the uplift, the tides, no doubt, helped to build up the land by washing up the sand on either side.

In places, slow-moving streams were trapped by the uplift, resulting in the formation of lagoons, such as the Narrabeen Lakes, Dee Why and Curl Curl Lagoons.

In concluding, Miss Drummond stated that in the Sydney district nature had provided us with three distinct types of bays. Botany Bay to the south, practically unaffected by the uplift, shallow, devoid of scenic beauty, and of little value as a commercial harbour.

Sydney Harbour, partially affected by the uplift, of great general depth, rich in scenic formations, and the ideal harbour of commerce, owing to the fact that no fast running rivers enter it to carry down silt, etc., and, northerly, Broken Bay, resplendant in scenic beauty, but marred as a harbour owing to the silting up caused by the fast flowing streams that enter it and to its very steep and dissected hinterland.—M. E. GRAY.

EGGS OF SHELL-BACKED SNAILS.

At the December meeting a jar containing young shell-backed snails was exhibited by me. These were bred from a cluster of round, white, soft eggs, which I found under a slab of wood at Gosford while on our last monthly excursion. About a week before they hatched the "skin" on one side began to get thin and semi-transparent. This ultimately broke and liberated the extremities of the young snails, but the centre part was still fastened to their backs by a powerful muscle. It was most interesting to watch these small creatures as they extended their tails and heads and thrust out their fleshy "horns." The "hard" side of the "skin" of each egg gradually hardened and developed into the peculiar shell-like "home," which we find the adult snails carrying about with them. The eggs took 26 days to hatch and possibly had been laid a few days before I found them, so probably the term of incubation would be about one month.—LUKE GALLARD.

GEOLOGICAL EXCURSION TO NARRABEEN.

By RALEIGH A. BLACK.

On Saturday afternoon, March 8, a party of about 20 field naturalists, under the capable leadership of Miss Heather R. Drummond, B.Sc., visited the Narrabeen Lagoon, about six miles north of Manly, chiefly for the purpose of studying the deposit, geologically known as the Narrabeen shales. This visit was really a sequel to the lecture delivered by Miss Drummond before the Society on Tuesday, February 4.

The party caught the 1.30 boat for Manly, thence tram to Narrabeen. A walk of about a quarter of a mile, crossing the bridge towards the west, brought the party to the foot of the cliff, which was ascended by means of steps.

A very fine range of scenery could be observed from this height, and it gave our leader a fine opportunity of illustrating her remarks, which really formed themselves into an interesting and informative lecturette.

It was explained that at intervals along the coast there are several large sheets of water locally called "lakes," but, of course, not true lakes, but lagoons, having communication with the ocean by narrow channels. These bodies of water are for the most part shallow, but choked by "spits" or sand-bars, which are sometimes dislodged, especially after heavy rains, when the banked-up waters break through and sweep away the bars. Some of these lagoons have been artificially reclaimed and turned into recreation grounds, such as the one at Manly, which was seen en route to our destination.

Miss Drummond pointed out that the Narrabeen lagoon was S-shaped and originally had been formed by an old river, which in the past was of a winding character in contradistinction to a young or juvenile river which has a more or less straight course.

In giving point to her lecture before the Society, she referred to Sydney as being nearly the centre of an extensive subsidence which similated the shape of a saucer. In this subsiding basin there were laid down, during great periods of time, the Greta coal measures, the Newcastle coal measures, the Narrabeen shales, the Hawkesbury sandstones and the Wianamatta shales. This area, then, was more or less low-lying, crossed by many rivers, draining to the north or north-west.

Miss Drummond said that the system of development of the abovenamed measures is known as the Triassic and was embraced by the Mesozoic or secondary period. She explained that the word Triassic was coined by German geologists from the Greek word, meaning a group of three, and had reference to the sub-division of certain European rocks into three distinct groups, which were similarly represented in New South Wales.

Late in the Tertiary times the low-lying land surface whose centre was near Sydney buckled up, both to the north and south of Botany Bay, resulting in the development of the Hornsby Plateau to the north and the Nepean Plateau to the south. This uplift was so gradual that the rivers cut down about as quickly as the land rose. At this period there were deep river valleys in most of the elevated areas, and broad shallow valleys in the region from Botany to Penrith where the uplift was slight. There was also a small amount of uplift at the south of Botany Bay.

In describing the Hawkesbury sandstone, which is estimated to be some 3,000 ft. thick, our leader was able to show that this series, at Narrabeen, was above sea level, whereas at other places towards the south it was at sea level, but further south still at Stanwell Park, for instance, it rises rapidly above sea level.

Miss Drummond referred to the "drowning" of the east coast line, to the depth of about 200 feet. This was caused, according to the opinion of many authorities, by the melting of the great ice sheets at the close of the last ice age. This rise of the ocean waters resulted in the conversion of the coastal valleys into long gulfs or arms of the sea well illustrated by Port Jackson, Port Hacking or Broken Bay.

The leader also referred to the folding, in late Tertiary times, and explained the manner of the instrusion of the lava along cracks in the sandstone. There the intrusive material cooled and formed the dark coloured basalt dykes visible in several places, including Long Reef, which could be seen from the Narrabeen cliff on which the members were standing.

Miss Drummond pointed out the presence of former submarine shelves on the coast, at Narrabeen and elsewhere, and remarked that their exposure was the result of either the ocean waters falling or the upward movement of the coast of about 10 feet. These former submarine shelves were now a protection to the bases of the cliffs, and thus prevented the wave action from wearing them away.

I am sorry that the space available in the *Journal* does not permit a fuller account of this interesting and instructive excursion. A hearty vote of thanks was accorded to Miss Drummond.

EXCURSION TO LONG REEF.

On Saturday, February 1, there was a largely attended excursion to Long Reef, near Collaroy, the leader being Mr. A. F. Basset Hull, Hon. Secretary of the Royal Zoological Society of N.S.W. The subject of the afternoon was "Shore Life," and the party viewed the extensive colony of Sand Crabs, whose burrows are found all over the face of the headland—from high water mark to the top of the sand dunes, over 100 feet above sea level. On the shore the mortality amongst the Petrels, of which some five species are washed up dead in hundreds each year, was discussed. The origin of the pumice stone found in the drift, with barnacles attached; the waste of kelp which could be utilised as a fertiliser, and other "drift" objects were examined and commented upon. The rock-pools were then visited, and the various molluscs found were named, and the structure of the univalves, bivalves, and multivalves compared. The lastnamed section was represented by numerous examples of *Haploplax lentiginosa,* with its delicate blue "freckling," *Sypharochiton pelliserpentis,* with its snakeskin girdle, and other varieties were noted and their structural differences explained. The day was perfection, and a picnic tea wound up an enjoyable and interesting excursion.

SOME OBSERVATIONS ON INSECT LIFE.—By H. McAnene.

Insect life noticed this year during February at Marrickville:—

Papilio sarpedon (Blue Fanny butterflies), but not nearly so numerous as during February of last year.

Antheraea eucalypti (Emperor Gum moths), eggs and larvae on pepper, *Tristania,* and peach tree leaves. These also are much less in evidence than during the corresponding period in 1929. During March and April, last year, these caterpillars were swarming in hordes over the pepper and *Tristania* trees, in some cases quite denuding the trees of leaves.

Danaida archippus (*Danais menippe*) (Brown Wanderer butterfly).—The wild cotton bush, one of its food plants, has been cultivated in some flower gardens; this may account for the presence of this beautiful butterfly in the suburbs.

Papilio aegeus, the black and white orange tree butterfly, appeared frequently. Its larvae are still on the young shoots of citrus trees.

NOTE ON THE IDENTIFICATION OF CERTAIN NOCTUID MOTH PUPAE.

By E. H. Zeck.

It is frequently a matter of difficulty to determine the identity of some species of *Noctuidae* while in their larval or caterpillar stage, owing to their close resemblance, one to another, and to the colour variations which they exhibit, and it is often found necessary to develop them until the adult form has emerged. Sometimes only one or two caterpillars may have been taken, which, after attaining their pupal or chrysalis stage fail to develop further, or possibly only a single pupa may have been obtained.

With the commoner forms, of economic importance, mentioned below, I have found that the arrangement of the spines or hairs (cremaster) at the extremity of the abdomen of the pupae, presents characters by means of which they may be readily identified when viewed through a hand lens.

It is not necessary to describe the arrangement of the spines, as these are indicated in the accompanying diagram, the species being as follows:—

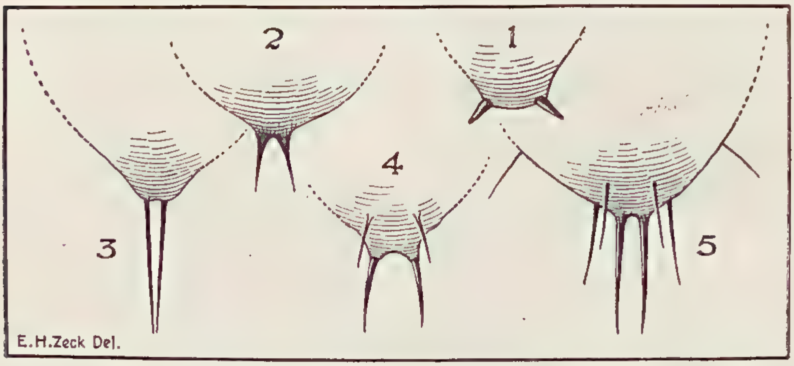


Fig. 1. *Persectania evingi* Westw. Distribution, Australia, Tasmania, New Zealand. Recorded feeding on grasses.

Fig. 2. *Prodenia litura* Fab. Almost world-wide. Recorded feeding on castor oil, tobacco, tomato, lucerne, maize, grasses, lantana and cabbages.

Fig. 3. *Heliothis obsoleta* Fab. (The maize and tomato moth). Almost world-wide, and has an extensive range of food-plants, maize, cotton, tomatoes, etc.

Fig. 4. *Euxoa radians* Guen. Australia, Tasmania, New Zealand, Friendly and Norfolk Islands. Feeds on grasses, etc.

Fig. 5. *Cirphis unipuncta* Haw. (The army worm). Extensive range throughout the world. Feeds on grasses, cereals, etc.

NOTE ON JAPANESE FIRE-BELLIED NEWTS (*Molge*, sp.).—By M. E. Gray.

Newts are quaint little animals, of particular interest to the naturalist, as they possess some rather strange features.

Generally speaking they do not look unlike lizards, but close observation reveals the fact that they are amphibians and related to the frogs and toads—in fact, their life-history is very similar to that of the frog, passing through the egg, tadpole and imago stages.

They cast their skins at intervals (eating the skin as they peel it off) and have the power of renewing limbs or portions of limbs that have been bitten off by enemies or otherwise lost.

As pets they are not particularly interesting, being somewhat sluggish, and, even in the matter of locating food supplies, rather stupid. They are voracious eaters when once the food is located. They are not particular as to diet, eating insects such as small moths, flies, etc, worms, and, when natural food is not available, chopped-up raw meat. They swim tadpole-wise with motions of their tails, but much of their time is spent out of the water, either clinging to the sides of their tank or curled up on a piece of rock provided for the purpose. The pair exhibited by me have been in my possession for seven months and seem to have settled down to their conditions.

BADGES.

Members may now obtain the Society's Badge from the Hon. Secretary (Mr. R. A. Black, Box 2178 L.L., G.P.O., Sydney) for 2/- (postage and package extra), or from the Hon. Assistant Secretary (Miss Dolce Dobbin, c/o Bank of New South Wales, William Street, Sydney.

OBSERVATIONS MADE IN THE NEIGHBOURHOOD OF BARRINGTON TOPS.—By Miss Clarice Heyner.

After leaving Salisbury the country is typically dairy-farming and grazing. The *Casuarina-Eucalyptus* association prevails for about five miles. Then one enters the brush where the vegetation is tropical, tall trees, corkwoods, coachwood, the endemic "beech" (*Fagus moorei*) intermingle with llianas, that trail and tangle from tree to tree, with tree orchids, bird's nest ferns and tall *Alsophila* flourishing everywhere.

The giant moss, *Dawsonia excelsa,* grows to perfection there. In the upper part of the brush the forest is more open.

The summer flowers were very prolific; *Wahlenbergia gracilis, Stylidium,* and yellow and white *Helichrysum* made a picturesque display.

In the long stretches of swamp were found sedges, stunted grasses and mosses, which were retarded in growth by the mineral content of the water.

On the edge of Barrington River *Viola,* wild forget-me-nots and *Pimelia* were found.

Eels and trout are found in the Barrington River, and wombat tracks were noticed by the girls.—LUCY A. HEYNER.

NOTE ON A PECULIAR SPECIMEN OF *Antheraea eucalypti.*—By L. Gallard.

At the March meeting I exhibited a specimen of the Emperor Gum Moth, *Antheraea eucalypti,* with most peculiar markings, apparently half male and half female. One often obtains specimens showing a great colour variation, but this is the first time I have seen each pair of wings on the same moth of an entirely different colour. In this example we have certainly a most interesting specimen, for the wings on the left side are of the bright fawn colour, usually found in the male, while those on the right side are of the dull colour usually found in the female.

The line of colour demarcation runs clearly through both head and body, in a well-defined line. One side of the head is light and the other dark. The colour around the margin of the wings, and also in the cross-bars, corresponds with those of both sexes.

The antennae are both of the male type, and the body, also, appears to be that of a male. The specimen was bred by Mrs. S. Howell, but unfortunately it was not well set and is slightly damaged, as when I noticed its peculiarities I did not like handling it any more than necessary, and for the same reason did not attempt to dissect it much as I would have liked.

NATURALISTS' SOCIETY OF NEW SOUTH WALES.

Proceedings.

February, 1930.

The first meeting of the year, 1930, was held in the Assembly Hall, Department of Education, on Tuesday, February 4, at 8 p.m.

The President (Mr. David G. Stead), in the chair.

Correspondence.—The General Secretary of the Australian Association for the Advancement of Science wrote inviting the Society to nominate delegates to the Council for the next meeting, which is to be held in Brisbane from May 8 to June 4, 1930. Upon the acquiescence of Mr. John Powell he was unanimously appointed a delegate; the finding of another delegate was left in the hands of the President and Honorary Secretary.

Dr. A. B. Walkom notifying that in future the Australian Science abstracts will be edited by Dr. G. A. Waterhouse.

Wireless to Commander Bird, sending congratulations of his magnificent exploits and his reply of thanks.

Nomination of Member.—Mr. John Ludowici, junior, Lane Cove.

Treasurer's Statement.—Mr. John Powell submitted his monthly statement, which showed a balance in the bank of £55/16/3.

Condolence.—The President feelingly referred to the death of Mrs. White, the mother of the Honorary Lanternist.

Lecture.—The President (Mr. David G. Stead) gave a most informative and interesting lecture upon the "Parenthood in Fishes," which was illustrated by a fine series of lantern slides. He was accorded a hearty vote of thanks by acclamation.

Exhibition of Specimens.—Mrs. Buchanan: Specimen of wood moth.

Mr. Luke Gallard.—"Cockscomb gall" beetle belonging to the genus *Symphyletes*. Specimens of Braconid wasps, said to be the largest species in the world. Mosquito larvae taken from water trough.

Mr. W. W. Froggatt.—Specimen of the rare Bladder Cicada, *Cystosoma saundersi*.

Mrs. L. A. Heyner.—Specimen of Bastard Rosewood, *Synoum glandulosum*.

Mr. G. G. Park.—Specimen of Loricate and flower of *Lagunaria patersoni*.

Mrs. S. A. Howell.—A tortoise and specimen of coachwood from Berowra Creek.

Miss L. Steinbeck.—Specimen of "Kangaroo Paw" and flowers from Mr. Ashby's garden at Blackwood, Adelaide; and also specimens of Tasmanian Blue Gum, Oregon Pine, Everlasting Daisy, with three heads, and a sea fan from Bermudas.

Excursion.—The report of Mr. A. F. Bassett Hull, who was leader of the excursion to Long Reef, near Collaroy, on Saturday, February 1, was read with great interest.

Report of visit to the country in the neighbourhood of Barrington Tops. Mrs. L. A. Heyner read a very interesting account of the vegetation observed there.

MARCH, 1930.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, March 4, 1930.

Mr. W. W. Froggatt (Vice-President), in the chair.

Nomination of Members.—Miss K. Breen, Bongalong Street, Crow's Nest. Proposed by Mr. R. A. Black, seconded by Miss D. Dobbin.

New Member.—Mr. John Ludowici, junior, was unanimously elected a member.

Resignations.—Mr. A. S. Le Souef tendered his resignation owing to other engagements. This was received with regret. Miss H. R. Drummond's resignation was accepted with regret. (Miss Drummond stated she would be willing to lecture or lead an excursion).

Treasurer's Statement.—Mr. John Powell submitted his monthly statement, which showed a balance in the bank of £66/15/11.

Lecture.—Miss H. R. Drummond, B.Sc., lectured upon "The Evolution of the Topography of the Sydney district," for which she was accorded a hearty vote of thanks.

Exhibition of Specimens.—Mr. G. G. Park, specimens of the Purslane tree, *Portulacana afia,* and the Poplar-leaved Homolanth, *Homolanthus populifolius.*

Mr. W. W. Froggatt.—Specimens of Quandong, *Fusamus acuminatus.*

Mr. M. E. Gray.—Live specimens of the Japanese fire-bellied newts, *Molge,* sp.

Mrs. S. A. Howell.—Lizard eggs.

Mr. Mills.—Spider's nest on leaf of loquat.

Mr. Luke Gallard.—Preserved specimens of the freshwater Gudgeon, *Gobiomorphus coxii,* and the Macquarie Perch, *Macquaria australasica.*

Professor A. J. Abbott.—Specimens of fruit of *Capparis mitchelli.*

Mr. John Powell.—Preserved specimens of elvers of the longed-finned eel, *Anguilla reinhardtii.*

Miss L. Steinbeck.—Live specimen of a stick insect, *Diura titans.* Specimens of cells of the leaf-cutting bee.

Miss H. McAnene.—Notes on insects observed during the month of February.

April, 1930.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, April 1, 1930.

The President (Mr. D. G. Stead), in the chair.

Correspondence.—Letter received from the Tasmanian Naturalists' Society, notifying the holding of their Easter camp, was read.

Letter from the General Secretary of the Australian Association for the Advancement of Science, notifying that the names of Dr. G. D. Osborne and Mr. John Powell would be placed before the general Council as delegates representing the Society at the meeting to be held in Brisbane in May next.

Letter from the Royal Zoological Society of N.S.W., expressing willingness to waive any claim for payment for use of their room. Resolved that a letter of thanks be forwarded to the Honorary Secretary.

Letter from Mr. W. Boardman, of the Australian Museum, advising that the tides and times would not be suitable for excursions until the spring or early summer.

Letter from Miss L. Steinbeck suggesting that the Mangrove Mountain be re-visited in August next.

New Member.—On the motion of the Honorary Secretary, Miss K. Breen was unanimously elected a member of the Society.

Resignations.—Mr. Robert A. Dallen forwarded his resignation owing to his leaving for England shortly. This resignation was accepted. Also those of Mr. G. L. Turner, A. J. McGow, Miss M. Boyce, and Norman R. Ayre.

Treasurer's Statement.—The Honorary Treasurer (Mr. John Powell), submitted his monthly statement, which showed a balance in the bank of £58/8/10.

Greetings.—Greetings from the Field Naturalists' Society of Tasmania to its sister Society in N.S.W. were conveyed by the President (Mr. D. G. Stead), who recently visited Tasmania and lectured before that Society.

Welcome.—A welcome was extended to the Rev. E. Norman McKie, of New England, N.S.W.

Lecture.—The Rev. E. N. McKie gave a very interesting account of the country around and about the New England district.

Exhibition of Specimens.—Messrs. M. E. Gray, P. E. B. Barnett and R. A. Black showed lantern slides of various interesting subjects.

Miss H. McAnene.—Specimens of galls, *Apiomorpha conica,* and parasitised cocoons of *Pinara despecta.*

Mrs. S. A. Howell.—Photographs of trap-door spiders' nests, of which she stated as many as thirty holes were found in a back garden at Lane Cove.

Mr. E. Gostelow.—Paintings of two moths.

Mr. M. E. Gray.—Live specimens of the "Yabbie," *Parachaeraps bicarinatus,* and a crab.

Mr. W. W. Froggatt.—Specimens of *Dodonea triquetra* showing great variation in leaves, and a fine collection of insects captured on late flowering *Angophora.*

Mr. G. G. Park.—Specimens of *Bougainvillea glabra.*

Miss F. Chamberlain.—Painting of yellow-banded or St. Andrew's Cross Spider.

Nielsen Park.—The President moved that a letter be sent to the Minister for Lands drawing attention to the proposal of the Trustees of Nielsen Park to set aside an area of the Park sufficient to park 2,000 cars and request that permission be withheld. Agreed to.

Open Season for Opossums in Victoria.—Resolved on the motion of Mrs. Howell that a letter be forwarded to the Premier of Victoria deprecating the open season for the slaughter of opossums.

Upon the Secretary asking the Council if it would agree to purchase "An Australian Bird Book," Mrs. Howell volunteered to make a donation of it to the Society, for which she was thanked.

NOTE ON ELVERS OF *ANGUILLA REINHARDTI.*

(Exhibited at March Meeting.)

On the evening of February 13, I, with a few others, went to see the Elvers of the long-finned eel (*Anguilla reinhardti*) which were migrating from the salt water to the reaches of the fresh water in Parramatta Park. It was well after sun-set, but with the aid of an electric torch I was able to see them in great numbers wriggle a laborious way up a damp trickle on the face of the concrete wall of the Marsden Street weir, about 10 feet high.

These eels are bred in the sea thousands of miles distant, and take three years to reach the head of the Parramatta River. The specimens were about two inches long.—JOHN POWELL.

NOTES ON SOME LANTERN SLIDES shown at the last "Members' Evening."

Amongst the interesting slides shown by Mr. W. W. Froggatt were those presented to him by the Queensland Tourist Bureau, illustrating the Nature reserves in that State. Those of special interest depicted the Blackall Range vegetation; Cunningham's Gap, near Maryvale, on the Darling Downs, discovered by Allan Cunningham, June 11, 1827; Main Range, Toowoomba; Uluah Park, Maryborough; Mount Coot-tha Reserve; Lamington Plateau, South Queensland; Mount Greville, Sassafern district; and the remarkable rock formation of the Stanthorpe district.

Mr. P. E. B. Barnett showed a collection of slides, some of which were taken whilst on his recent trip to Europe. Among those shown were the Hoary-headed Grebe, which had been found stranded in a paddock at Narrabri, but was later released on a small lagoon where there were others of its species; young of the Great Crested Grebe, after emerging from egg, endeavouring to escape into the water from its nest, taken at Lake Moodamere, Victoria; Frilled-Lizard, taken in the act of robbing a Wood swallow's nest at Burrowa; group of three young hares (leverets) found in a wild state, with mother in attendance, photographed when about six hours' old, at Burrowa; a Tarantula spider with egg sac, a remarkable fungoid growth and a Bulbul's nest and eggs taken at Chatswood; three photographs of the Yellow-breasted Shrike-Robin's nest taken at Warrawee.

NOTE ON EXHIBIT.—At the last meeting of the Society, the living example of the "Yabbie" exhibited by me, was captured in a small creek at French's Forest. The right "nipper" was only a "bud" when the specimen was first captured, but during the two months the "Yabbie" has been in my possession its "nipper" has developed to almost its full size.

The living crab exhibited was captured on the bank of Cattai Creek, Windsor, and, although its "nippers" are strongly developed, it has not so far used them in defence, and can be handled with very little fear of a nip. It is powerful enough to hold a lady's handbag and contents weighing seventeen ounces; shown in lantern slide. The crab itself weighed half an ounce. Judging by the numbers of holes in the vicinity where the specimen was taken they cannot be rare.—M. E. GRAY.

Note on Exhibit.—At the February meeting two specimens of insect galls were exhibited by me. One specimen somewhat resembling a cockscomb was taken from a "Blackbutt" sapling at Ettalong; the winged males which had since emerged were shown in spirits. Mr. W. W. Froggatt, who kindly identified both this and the following species informed me that that species was *Apiomorpha pharetrata;* also that most of these gall making coccids have distinct detached galls, but in this species the male galls form a convex mass of tubes, each containing a two-winged slender male coccid, and which grow out from the side of the oval female gall.

The second example consisted of a cluster of spindle-like galls taken from the limb of a "box"-tree at Lakemba. These, Mr. Froggatt stated, were formed by small chalcid wasps known as *Tepperella eucalypti.*

The large black and red Braconid wasp which somewhat resembled a Mydaid fly, was taken on the wing amongst ferns at Woy Woy. This, I believe, is the largest species of Braconid known, and I am very anxious to hear from anyone who has bred or may breed it from any definite host.—Luke Gallard.

REVIEW.

A valuable publication, entitled "Catalogue of the Scientific and Technical Periodicals in the Libraries of Australia," has been issued by the Council for Scientific and Industrial Research.

"The main object of the catalogue is to enable the research worker to ascertain readily where a reference met with in the course of his studies may be consulted. A subsidiary, but nevertheless important, purpose is to serve as a guide for Australian librarians to the latest methods of cataloguing periodicals. To this end, definite rules have been followed."

"The various notes will also enable librarians to check their sets and to fill, perhaps co-operatively, their lacrunae."

"All periodicals of a scientific and technical nature and publications issued serially by scientific and technical institutions and societies have been included."

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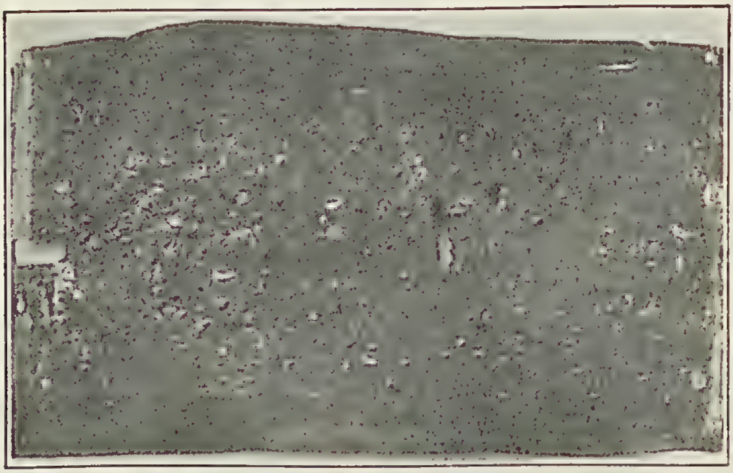
LIFE AND TROUBLES OF AN OYSTER.

By DAVID G. STEAD.

(Summary of Address given by President at the Meeting on June 3, 1930.)

This lecture, designed mainly to answer the many popular inquiries relating to our edible oysters, dealt with the life-history, geographical and local distribution, natural enemies and methods of oyster culture principally in vogue. It was illustrated by many photographic lantern slides, depicting natural and cultivated oyster growths, oyster enemies, etc. Limitations of space in our Journal necessitate a very short summary of the main facts, as accumulated by me during the past thirty years or so, both at home and abroad, but chiefly on the coasts of New South Wales, Queensland, Victoria, and Tasmania; with the addition of some intensive study on the south-eastern coast of Great Britain and Denmark, and in Chesapeake Bay on the east coast of the United States of America.

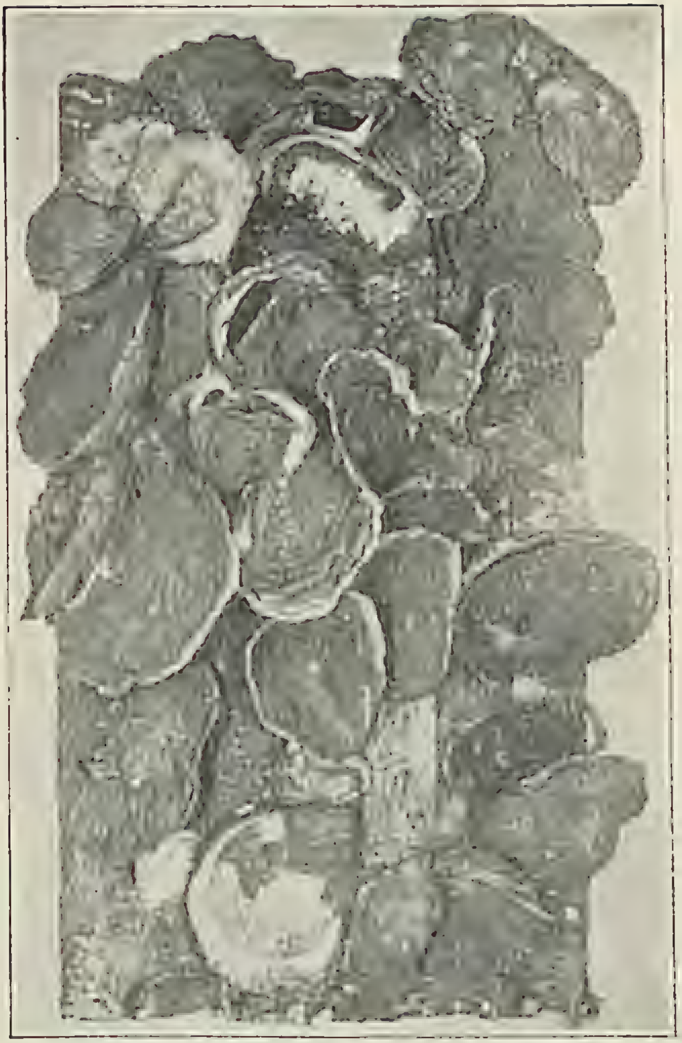
Australian Edible Oysters: (1) The Rock Oyster, *Ostrea cucullata,* and (2) the Mud Oyster, *O. edulis* var. *angasi.* The principal commercial kind is the Rock Oyster, with which these notes are mainly concerned. The Mud Oyster grows to a large size—even up to nine inches in diameter—and is found on muddy-sandy bottoms in water, usually, of greater density than that in which the New South Wales commercial oyster is found. The Mud Oyster becomes more abundant as we proceed southward. It was at one time extremely abundant in some of the coastal waters of Victoria (where it may, by careful cultivation, be brought back to an important commercial position). A variety of this is found quite abundantly in Ralph's Bay and other bays contiguous to Hobart in Tasmania. These were recently investigated by me at the request of the Tasmania Sea Fisheries Board. They are capable of great development and should be a source of considerable wealth to the island State. Another variety of this Mud Oyster is the so-called "Stewart Island" Oyster of New Zealand. The well known Whitstable and Colchester "natives" in England are also of this species, *Ostrea edulis.*



Oyster Spat, from one week to five weeks old, on side of petrol tin.

Rock Oyster. *Distribution*: This oyster is widely distributed in Australia, and is also found in parts of New Zealand. The common Rock Oyster of Malayan waters and that of Japan and elsewhere are probably not specifically distinct from this kind. Also, the common American Oyster, *Ostrea virginiana,* is closely allied. From a commercial viewpoint, the main area affected by this oyster is from the coast of southern Queensland to the northernmost parts of the coast of Victoria.

Local distribution is controlled mainly by the density of the water. A certain admixture of freshwater is essential. In some estuaries the zone of water of correct density is very shallow, while in others (as at Camden Haven) there may be considerable stretches, where the density is suitable from bank to bank and running right across the bottom. In places like Port Jackson (lower parts) the zone of dispersal will be principally from about half-tide to



Oysters, 12 months old, attached to house tile.

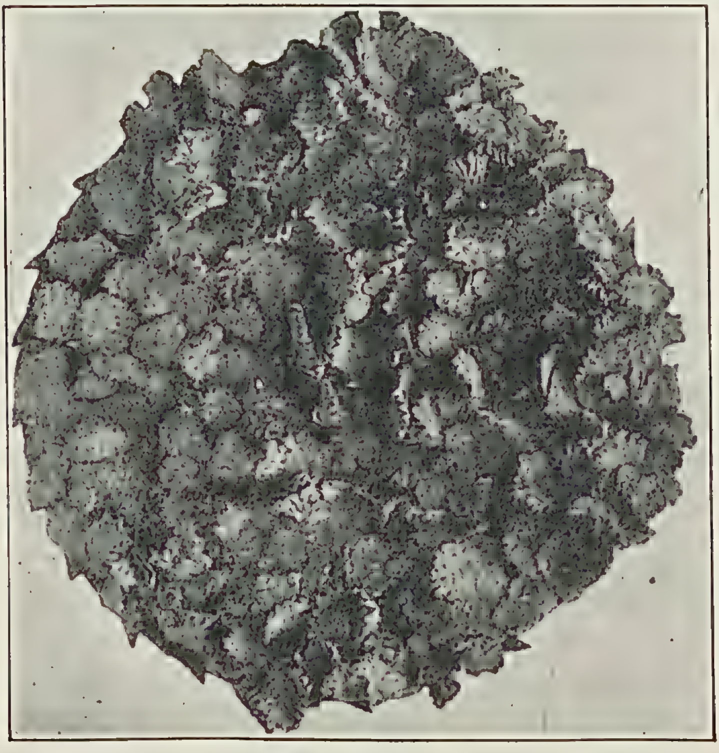
about mean low tide mark--but there are many local variations of this, according to the amount and location of seepage of freshwater from the shoreline. In the estuaries of coastal rivers the oysters may be found generally from near the ocean entrance to a considerable distance upward, according to the mean volume of freshwater that finds its way down the river or creek. Oysters may close up for even several weeks in times of great freshets in river estuaries and may live in places where the water is very "weak" in salinity, but they only really flourish in places where there is a permanent infusion of freshwater —to the extent, say, of one-sixth or one-fifth of the volume of the whole of the tidal waters present. This seeping freshwater conveys and promotes the development of the food organisms on which the oyster subsists.

Suitability of Ground: Even where the density of the water is right it does not follow necessarily that oyster banks will exist, unless the bottom or shore is of the right type, or, otherwise, that there is a suitable catchment area. Soft muddy bottoms or those of pure sand are not suitable. In the one the oyster may be engulfed, and in the other sand grains may get in and prevent the oyster from closing its shell. Even on shorelines that are otherwise suitable there may be already marine or aquatic growths established there which will prevent the attachment of the tiny oyster young or spat. But in the hands of the expert cultivator, such are as may generally be rendered suitable—and many such have come under my notice. Similarly, though the soft squelchy bottoms are themselves unsuitable, stakes, stones, tiles, etc., may be so placed as to gather large crops of oysters where none would exist naturally.

Life History: This naturally brings us to the life-history of the commercial oyster. One of the most common queries is as to how such a hard-shelled animal can become attached in the position in which it is found. In the Rock Oyster the males and females are separate; the sexes not being united in the one individual as in the Mud Oyster. The principal spawning time of the year is the Spring and early Summer as a rule. But in our waters there is something still more important. Long droughts on the nearby lands naturally affect the supply of freshwater to the oyster beds. On the breaking of such dry periods and the proper influx of food-laden water, the oysters will "fatten," as it is termed, and will spawn. But such a spawning will be stronger in the seasons first mentioned. Oysters may barely exist for long periods, in a state of starvation, and practically without growth. Sometimes this will be in an area closely contiguous to a good-growing area. It may be due to unsuitable density or lack of food supply. Oysters in such a poor condition will spawn, but little, if at all.

When oysters are fat or ready for spawning, the main part of the "body" is white or cream coloured and has a large number of anastomosing channels or ducts visible, in a network, through the skin. These contain the eggs or the sperm cells, as the case may be. If a female oyster is cut on the side and some of the milky looking fluid laid on to a glass strip (clear or blue), the individual eggs may be seen with the naked eye.

The *eggs* are pear-shaped and are rather beautiful objects under a low-powered microscope. The sperm cells are extremely tiny, as usual. Fertilisation takes place in the water, the eggs and sperms being ejected and commingling as the tide or wind move the water. Segmentation and general development are very rapid. Shortly cilia appear, and these little hairs are used for propelling the wee embryo through the water, until at last, when two incipient valves have appeared, the young oyster alights on the spot where it is destined to grow; attaching itself by the left valve or side. Vast numbers of eggs and embryos are destroyed by various organisms—both stationary and motile. Many die where they are attached also, say, through tide falling, and the small fabric being subjected to the intense heat of the sun, or to the desiccating influences of high winds. This is the main reason why such large deposits of young oysters may be found on the under-



Oysters, 5 years old, on 3ft. circular saw.

side of a shingle, or stake, or stone, rather than on the top. From now on the young oyster grows rapidly; spreading out very thin at first and becoming more "cuppy" later. In shell "cultch" the greatest deposits of spat will occur at particular spots in the hollows of shells where there have been little eddying currents.

The *shape* of the oyster follows to some extent the form of the catchment material. Oysters on a surface of high convexity will usually be more cuppy than those on a flat surface; but this may be also controlled to some extent by the amount of crowding on that surface. Oysters often spread rapidly out, flat, and then when their edges meet each other they spring outwards from the surface. I can only speak in general terms in such a short summary, of course.

Rate of growth depends on many factors, such as suitable water, local currents, number of oysters to be fed in one deposit, crowding, occurrence of other organisms; also draining the same food supply by contiguous animal life attached to the same catchment. After a year an oyster may still be very small or quite large. I have seen oysters of three inches across which were only twelve months old, and, again, others of only one inch that were five years old. Speaking very generally, however, it may be said that the average over all seasons and on the whole coast might work out at about three years for a commercially sizeable oyster, or, say, from three to five years. Oysters in particularly favoured locations, such as those fastened to the back of a perambulating "Hercules Club" shell or "Whelk," grow rapidly and become very deep or "cuppy."

Productivity: Oysters are extraordinarily prolific in their production of eggs. I have found young oysters of only three-quarters of an inch in diameter which were producing eggs, but those of, say, three inches in length will normally produce immense numbers, aggregating many millions, in one season. Naturally, the rate of destruction is correspondingly great. I have calculated that were it otherwise *the progeny of one pair of oysters could soon cover an area equal to the whole of New South Wales* (310,000 square miles!). But this great fecundity is really the secret of the oyster cultivator's success, because, if he takes advantage of a knowledge of some of the natural laws governing the oyster's life, he can secure a far greater ratio of deposited spat and of developed oysters than will occur naturally, and this may go on right up to the limits of the food supply of the surrounding waters. This means, in effect, that a patch of water which in a natural state only produced, say, one hundred bags of oysters per annum, might, under judicious cultivation, produce one thousand!

Natural Enemies of Oysters: At the very outset the oyster is met with many besetting influences. Infertile eggs number millions, unsuitable waters destroy vast numbers also, and unsuitable catchment means the loss of untold numbers. Then many microscopic or very minute animals prey upon the eggs and young. Fishes of many kinds (both in their early stages and later), Mollusks, Worms, Starfish, and other animals take their toll, while many passive resisters like sponges and marine growths may envelop the oyster and stop its growth.

The common Black Bream, in the first and second years of life—say up to eight or nine inches in length—is an arch-destroyer of young spat. Toad-fish, Porcupine-fish, and others also account for many of a small size. Even when the oyster is well grown it is still open to attack by fish enemies; one of the worst of which is the big Eagle Ray (one of the whip-tailed stingrays) which has two plates of teeth like tesselated pavements of ivory, with which it crushes oysters of two inches or more in circumference.

Star-fish destroy many mature oysters at times—generally near ocean entrances or during times of high water density. The Star-fish wraps itself round the oyster and hangs on until the valves stand ajar, when the stomach is exserted and the oyster is consumed. These apparently harmless looking things, though destructive in Australian waters, are not nearly so bad as they are on the Chesapeake Bay beds in America. There, millions of the pest have to be grappled with and destroyed in one season, as I have seen.

The Oyster Worm or Polydora is one of the worst enemies of the commercial oyster, but in correct cultivation methods can be largely eliminated. The embryos of this pest are most abundant within a few inches of the muddy bottom and in dull de-oxygenated eddies, where there is much growth on the bottom. They may occur, however, in quite open water, and I have seen them in immense numbers sparkling with phosphorescence on a warm night, even in the limpid waters of Circular Quay, Sydney, during a dry period. This worm, like many other pests, is worse in dry times. The embryo makes its way into the oyster shell and then begins to grow rapidly, surrounded by a fine, smelly, muddy deposit. The oyster endeavours to get rid of its unwelcome guest and throws down a layer of nacreous shell. But the worm keeps two little channels open to the edge of the shell, so that even when the oyster has closed its valves the worm may breathe and go on feeding. Successive infestation by this worm causes the loss of many oysters, while an apparently healthy oyster with one of these worms under the body may have the flavour seriously impaired.

A number of marine boring shells are responsible for the death of many oysters every year. The method of attack is for the little whelk-like mollusk to set to work with its lingual ribbon and bore a hole through the top valve of the shell, then to eat the helpless oyster out at its leisure.

The turbellarian worm known as the "Wafer" (*Leptoplana*), destroys large numbers of oysters in times of high salinity. I first discovered this animal at work in the year 1907. Several years later a closely allied species was discovered destroying oysters in Chesapeake Bay, America.

The large Mangrove Crab (*Scylla*), which is abundant in the more northerly waters is to some extent destructive to oysters, but is considered more a disturber of oysters lying on the flats. The Octopus also will make its burrow amid the oyster bed, and will drag the oysters in a heap to envelope itself. A boring Sponge grows in the shells of oysters, but is practically confined to old shells or those in stagnant unworked areas (frequently one and the same thing).

Among the more passive enemies Mussels, Barnacles, Sponge and Ascidian growths and incursions of Seaweed are the principal agencies—gradually choking the oysters out from their food supply, and even completely enveloping them.

OYSTER CULTURE: This is an extremely important industry in the fisheries of many countries. In Australia it finds its greatest development in New South Wales and Queensland, but is capable of considerable development in other States. Various methods of cultivation are carried out, governed to some extent by the local prevalence of materials suited to the work. One of the best means of catching the spat is to place bundles of twigs or separate stakes of the Black Mangrove (*Aegiceras*) in the path of the tide, laden with the oyster embryos. But this tree has become rare or almost non-existent in many parts, through our general improvidence. Other timbers are used, such as White Mangrove (*Avicennia*), She-Oaks (*Casuarina*), etc. Bundles of fagots are often held in position with stakes of the Paper-bark Tea Tree (*Melaleuca*), the bark of which is highly resistant to the "Cobra" or "Teredo." Stakes of the various timbers, shingles, tiles, plates of fibro-cement, sheets of slate-like rock, slabs of stone, etc., are also laid out to catch the spat. Sometimes the spat is left to mature on the spot, but usually after a time—particularly in instances where the bundles of fagots are laid out—the young oysters are knocked off and are laid out on the deep-water beds, or dredge beds, where such are available. The whole procedure, although repeated in various waters, depends largely upon the local conditions. Sometimes—especially where the zone of oysters is shallow—the growing oysters will be laid out to mature on stretches of wire-netting.

Oysters may become attached to all sorts of catchment outside the objects mentioned. Living roots of the White Mangrove, as well as the air-roots or "cobblers' pegs" of such are a favourite place of attachment in suitable localities; but bottles, tins, old iron, broken crockery, and almost anything which can afford an anchorage frequently find their quota of oysters.

In oyster culture, as in agriculture, success is only attained by a close study of the natural conditions governing the whole existence of the oyster itself. There is no place for "rule of thumb," and a little science applied properly will go a long way towards success. When the rank and file of Australian oyster cultivators understand this, as do a few, then the industry will grow to an extraordinary extent.

Before closing this brief survey of the subject, it seems desirable to deal with two of the many fallacious ideas concerning oysters. I am most frequently asked as to why it is not desirable to eat oysters "during the months in which there is no 'R'." This question is prompted by a misunderstanding. The English Oyster (*Ostrea edulis*) is said to be "out of season" during these months, for at that period the eggs from the monoecious parent are discharged into the gills (the "beard" of the oyster) and are incubating there. Further, the gills are more or less slimy at the time, and the oyster is not considered fit to eat—although not harmful. But our common commercial oyster, as explained, is dioecious, and the eggs are discharged directly into the water, and *at no time are our oysters out of season.* It is quite important to stress this here. The second most frequent query is as to whether it is harmful to eat oysters grown on wood. The answer is definitely "No!" In these days, most of the oysters eaten in this country are first grown on some sort of wood, and they may truly be said to be among the best of the edible oysters of the whole world.

SNAKES.

By Raleigh A. Black.

(Abstract of lecture delivered before the Society in April, illustrated with lantern slides.)

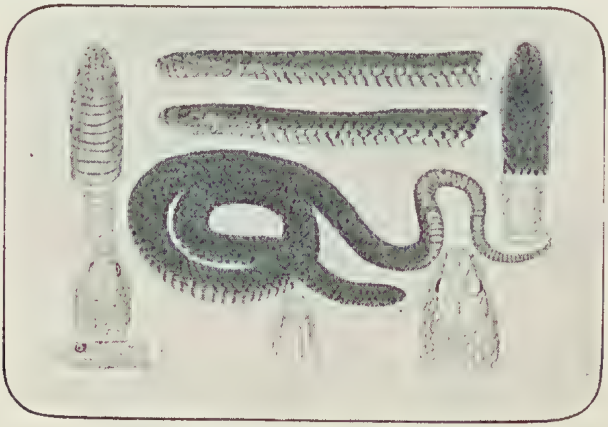
While the several species of snakes met with in Tasmania have received careful study in some respects, in conjunction with their mainland congeners and zoologists are quite agreed as to their species and number, the unscientific world is not so agreed.

There are only three terrestrial species of snakes recorded from Tasmania and one sea snake which, however, is so rare that it can be termed a reptilian migrant whose true habitat ranges from the Bay of Bengal to China Seas and S.W. Pacific.

Some bushmen will tell you that there are as many as ten different kinds of snakes in Tasmania; if this depended upon their colours and sizes then one might agree, but structurally there are only three different land snakes.

The Diamond Snake, *Denisonia superba,* Gunther.

This snake is also known as the "Superb," "Copper-headed" and "Large-scaled" snake. It is very hard to alter a name that has been in use for some time, but it does appear desirable to alter the name of "Diamond" to "Superb," because the true "Diamond" snakes are pythons and the Tasmanian one is not, and the name "Superb" would agree with the snake's scientific name, viz., *Denisonia superba.*



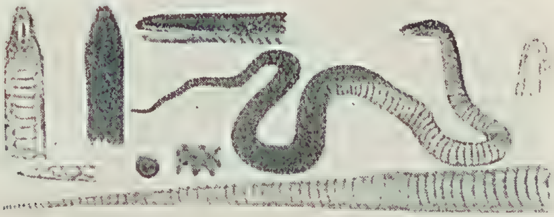
Denisonia superba, Gunther.
(From McCoy's *Prodromus.*)

The central scale on the head of the "Superb" snake is about twice as long as broad, sides concave. Head pointed, inverted, V-shaped, copper coloured markings at back of head. Colour of body variable. Length up to 5 feet.

The Superb snake, which ranges through Victoria, N.S.W. and South Australia, is not nearly so common in Tasmania as the Tiger snake. While this species usually frequents swampy country, it is also found in more open country. During the Tasmanian Field Naturalists' Club's excursion to Port Arthur, at Easter, 1918, Mr. Clive Lord secured a specimen of this species on the rocks at the summit of Brown Mountain.

The WHIP SNAKE, *Denisonia coronoides,* Gunther.

This species can readily be distinguished from the Superb and Tiger snakes by its long narrow central shield on its head and by possessing white markings on the lip and extending for some distance back behind the eyes. The central scale on its head is three times as long as broad. Body elongated and rounded. Head and tail not distinct from trunk. General colour very variable. Length seldom exceeds 2 feet.



Denisonia coronoides, Gunther.
(From McCoy's *Prodromus.*)

The Whip snake may be met with in most localities and has been noticed by some observers on the tops of some of our mountains (Tasmania).

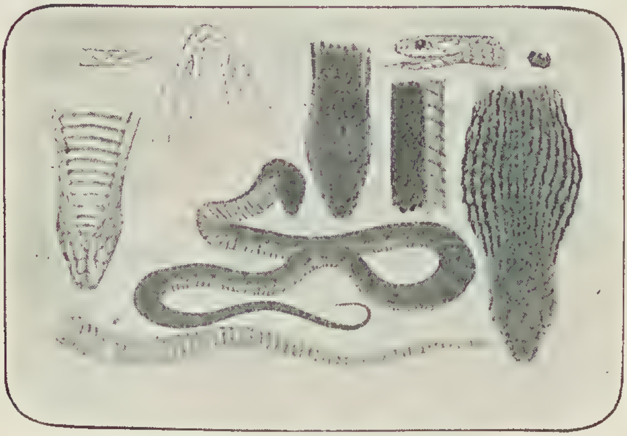
Its variety of habitat is only equalled by its variety of colours, which may be dark brown, green, red, any intermediate shade, or even white, but perhaps the most characteristic colour scheme is brown.

While this snake is usually treated with all the respect due to its class, it is doubtful if there is an instance of its bite proving fatal. The Tasmanian variety grows to a larger size than the Victorian form. Krefft has stated: "This snake, even when handled, seldom, if ever, offers to bite, and the wound caused by it is not as bad as the sting of a bee."

This species also occurs in New South Wales and West Australia.

The Tiger Snake, *Notechis scutatus,* Peters.

This snake is to be found throughout Australia and has been responsible for many deaths. The popular name of this snake is truly descriptive of its nature and character, for it is the most venomous and ferocious of all Australian snakes. The Tiger snake is also called the Brown-banded snake, the Black snake and the Carpet snake. Bushmen usually call the dark varieties of this species Black snakes, and the light varieties Carpet snakes. The central scale on its head is shield-shaped and almost as broad as it is long. Head distinct from neck, body cylindrical. Colour variable from black to sand colour, with more or less prominent yellowish bands. Length up to 5 feet.



Notechis scutatus, Peters.
(From McCoy's *Prodromus.*)

When fighting the Tiger snake raises itself on to the tip of its tail. The head is directed forward almost at a right angle to the body, the neck distended like an Indian Cobra, while the tongue darts in and out with great rapidity, accompanied by a hissing noise.

When nearing the top of Mount King William I, in company with Mr. Ernest Rodway, we were opposed by a large Tiger snake in this manner.

Our Agricultural Chemist had an interesting snake adventure some years ago in the vicinity of Gunn's Plains. He camped in an old hut and some time after he had retired he felt something in his bed, but being tired and sleepy he only made a very cursory investigation and was soon fast asleep again. Next morning, when dressing, to his great astonishment and alarm, he noticed very animated movements in his blankets; soon a large snake's head appeared, then its long sinuous body. Like a flash it passed through the open door and disappeared into the bush. The three districts, in Tasmania, in which I have noticed the most snakes are Old Beach, Table Cape and Circular Head. On one occasion, when journeying to Stanley in the coaching days, we killed seven large Tiger snakes on the road.

Our party was crossing the Cuvier Button-grass Plains on foot, en route to Mount Olympus, when, as we were tramping through the grass-like undergrowth, which was kept fairly moist by the drainage from Mount Olympus, we noticed several snakes and were consequently on the lookout. Suddenly I felt a horrible squirmy feeling under my foot, which sent a shudder up my back, and instantly I knew that I was walking over a snake. Thinking that it would soon be coiled round my stockinged leg, I hastily left that spot. No doubt the thickly growing Button-grass prevented the snake from striking.

An erroneous belief is current amongst bushmen respecting the escape from danger of young snakes when sporting with their mother. They will tell you that should you unexpectedly approach a mother snake with its young it will instantly swallow them and then disappear, and after the danger has passed it will disgorge them. You may rightly take all this with a grain of salt! For it does no such thing. What does happen is this: Immediately on the very inkling of danger the young take cover. The snake is killed and dissected and young are found inside it, but these are not the ones that were seen for a moment, but unborn ones. A snake does not give birth to all of its young simultaneously.

People who explore our forests do not know how really well off they are as regards freedom from danger of wild and ferocious animal-life which is prevalent in some other countries. As a contrast to the species of snakes inhabiting Tasmania, I showed on the screen an Indian Python, the largest Old World representative of its race. This python is known to attain a length of twenty-five feet, and in the largest specimens the spinal column may contain over 400 vertebrae.

In common with other members of its family, this huge snake kills its quarry by compression or strangulation, throwing around it successive coils of its body, which by their contraction crush out the life of the victim. The dispatched prey is then swallowed whole, commencing with the head.

The jaws of snakes are capable of almost unlimited distension, and this enables them to swallow much larger creatures than would otherwise be possible. The action of swallowing is automatic. The monster shown on the screen had disposed of a goat weighing fifty-two pounds. Further particulars of this python will be found in Hutchinson's "Animals of all Countries," pt. xxvii., p. 1285, and of Tasmanian snakes in Lord and Scott's "The Vertebrate Animals of Tasmania," pp. 104-108, also in Lord's "Tasmanian Snakes," 1919, from which works I have drawn much of the above information.

These notes, delivered before the April meeting of the Society, formed part of a natural history lecture given at Franklin, Tasmania, by the writer on his walking trip across Tasmania some time ago.

MEMORIAL TO THE LATE J. H. MAIDEN.

N.S.W. Government Botanist and Director Botanic Gardens, Sydney.

On May 19th last a number of representatives of Scientific and other Societies, as well as members of the public, attended the dedication of a shelter pavilion and the unveiling of a memorial tablet to the memory of the great Australian botanist, J. H. Maiden, by the Lieutenant-Governor, Sir William Cullen, K.C.M.G., LL.D., in the Botanic Gardens, Sydney.

Among those present were members of the late Mr. Maiden's family, including Mrs. J. T. Paton, Dr. and Mrs. Brown Craig, Mr. and Mrs. George Garnock, Miss Dorothy Maiden, and his little granddaughters, Misses Lucy and Ann Brown Craig.

Speaking on behalf of the Government, the Premier (Mr. Bavin), said that Mr. Maiden was not only a great scientist and distinguished public servant, but a good and loyal man, whose work brought honour to Australia.

After referring to Mr. Maiden's useful official services and of his scientific attainments, he indicated the important bearing the Botanic Gardens and National Herbarium had upon the life of the community.

Last year over 200,000 trees were despatched to various parts of the State, and large numbers of plants were identified by the staff and senders advised of their relative values. In the Herbarium there were housed 54,000 specimens of exotic plants, comprising a historical record of Australian botany from the earliest times.

Sir William Cullen said that the ceremony was in honour of one of their greatest public servants, and when they honoured such men they honoured themselves. The distinctions that were heaped upon Mr. Maiden by the Societies, not only in Australia, but from abroad, were evidence of his eminence and a tribute to an unostentatious citizen, who knew his work and did it well.

Professor Vonwiller, President of the Royal Society, said it was well that they should erect memorials to their great Australians, because it was well known that some of the greatest scientific work was not always generally appreciated.

Professor Sir Edgeworth David spoke most eloquently of the late Mr. Maiden's life-work, which was devoted to the interests of his fellow-men. He had set an example difficult to excel, in spite of being sorely afflicted in his later years by bodily infirmity.

The inscription on the tablet is as follows:—

Maiden Memorial Pavilion,
to perpetuate the memory of
J. H. Maiden, I.S.O., F.R.S., F.L.S.,
Government Botanist, 1886-1923.
Erected by Public Subscription, 1929.

Among those present, as representatives of the Naturalists' Society of New South Wales, were: Messrs. David G. Stead (President), W. W. Froggatt (Vice-President), D. W. C. Shiress, A. G. Hamilton, Miss L. Steinbeck, and Mr. Raleigh A. Black (Hon. Secretary). Other Societies were also well represented.

Mr. Maiden was for some time a member of this Society, and in many ways assisted it from its inception up to the time of his death.

—R. A. B.

An ant of new genus and species belonging to the subfamily *Formicinae* (Sugar ants, Honey ants, etc.), has been recorded from Australia by Professor W. M. Wheeler, in Psyche, xxxvii., No. 1, March, 1930. The specimen which has been named *Aphantolepis quadricolor* was collected among fallen leaves in the Cairns district, Queensland, by Mr. A. M. Lea.—Ed.

EXCURSION TO FULLER'S BRIDGE.

By RALEIGH A. BLACK.

About 30 field naturalists, under the leadership of Mr. M. B. Welch, B.Sc. (Economic Botanist to the Technological Museum), made an excursion to Fuller's Bridge, on Saturday afternoon, May 31st.

The main objective of our leader was to speak about the larger forms of vegetation, such as the Eucalypts, Angophoras, etc., but he found time also to name and explain other forms of plant life.

Those members who only possessed a little knowledge of botany were delighted with the help and assistance rendered by Mr. Welch in identifying and explaining the uses of many plants gathered in this locality.

Of the tree life the first noticed was the Sydney blue gum, *Eucalyptus saligna,* Sm., which should not be confused with the "blue gum," *Eucalyptus globulus,* of Victoria, or Tasmania. Mr. Welch explained that the Sydney "blue gum" was one of the best hardwoods of the State, and is of a light red colour, straight in the grain, comparatively easy to work, and, therefore, a favourite with carpenters. Its bark is smooth, of a somewhat bluish colour, and overlaid at the base by a rough bark. Under favourable conditions this tree will attain a height of 150 feet, with a diameter of 3 to 4 feet. Growing close by was the "Blackbutt," *E. pilularis,* Sm., which has a fibrous bark on the butt, while the branches are smooth and whitish. Specimens of the fruits of both gums were collected and their differences noted. Mr. Welch said that the "Blackbutt" produced a strong, durable timber, and was used for house and ship building, and was one of the best timbers in the State for wood-paving blocks as regards wear and durability. On the higher levels the "Scribbly Gum," *Eucalyptus micrantha,* Benth., was noticeable by its white stem covered more or less with small irregular yellowish tinted patches, and Mr. Welch explained that it was often confused with the "White Gum," *E. haemastoma,* Sm. The latter possesses one of the smoothest barks of the gums, but has a few ribbony flakes near the butt.

It was not an ideal time of the year for flowers, but the following were observed: Bush Violet, *Ionidium filiforme;* Sunshine Wattle, *Acacia discolor;* Prickly Jack, *A. juniperina;* Sweet-smelling Acacia, *A. suaveolens; A. floribunda;* the original black wattle of Sydney, *Callicoma serratifolia;* Sundew, *Drosera pygmaea;* Snow bush, *Olearia ramulosa; Lobelia gibbosa;* Bloodroot, *Haemodorum planifolium; Grevillea buxifolia; Hakea dactyloides; H. pugioni-*

formis; H. acicularis; Banksia serrata; B. spinulosa; B. collina; Petrophila, sp.; *Persoonia salicina; Epacris microphylla; Lysinema (Woollsia) pungens* (pink and white varieties); Five Corners, *Styphelia viridis; Pultenaea stipularis; P. incurvata; P. elliptica; Bossiaea heterophylla; Hardenbergia monophylla; Trachymene linearis;* Tick bush, *Kunzea corifolia; Angophora Bakeri; Eucalyptus corymbosa; E. piperita;* the Sydney Peppermint.

Mr. Welch referred to the probable evolution of the Eucalypts and Angophoras, and said that both groups had apparently a similar line of descent. Only one feature seemed to separate these two genera, and that was the absence of the operculum in the Angophoras and its presence in the Eucalypts.

He said that the venation of the matured leaves of *Eucalyptus corymbosa* was found to correspond with that of the leaves of the *Angophora.* Messrs. Baker and Smith in their Research on the Eucalypts, especially in regard to their essential oils, distilled oil from the leaves of *Angophora lanceolata,* and *E. corymbosa,* and found it to contain identical constituents.

Much more could be said about this interesting excursion, but the want of space forbids. After partaking afternoon tea in the true "billy" style, a vote of thanks was carried by acclamation.

NOTE ON A CRAB, *Sesarma,* sp.

By M. E. Gray.

The specimen of a crab taken by me at Cattai Creek, N.S.W., on March 23, 1930, and exhibited at the April meeting, has been submitted to Mr. F. A. McNeill, of the Australian Museum, for identification. Mr. McNeill determined it as belonging to the genus *Sesarma,* and believes it to be a species new to science.

On May 6th, accompanied by Mr. Mel. Ward (Hon. Collector for the Australian Museum), I again visited the locality where the first specimen was secured, and the very interesting series of examples captured ranged from small spider-like immature forms to full-grown males and females, all of which were taken from their burrows.

I have since searched the banks of a number of small creeks flowing into the Hawkesbury, near Windsor, for signs of the crabs, but with no success.

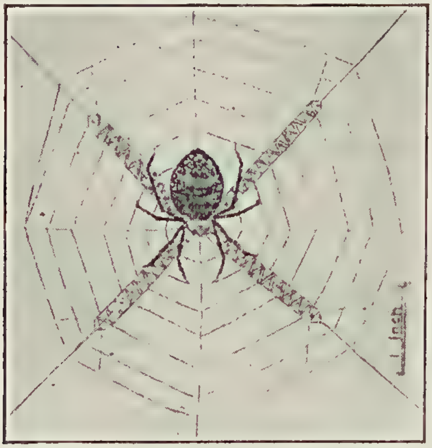
My original specimen has settled down to its environment, in a wooden tub, and has delved out a typical burrow in the small mud bank provided for it. I have experimented with a number of the common Sydney species, *Sesarma erythrodactylus*, in an endeavour to acclimatise them to living in fresh water. The longest period I have been able to keep one alive in fresh water is 21 days, the specimen being an almost full-grown female. Young forms seldom survived for more than a week.

(It would be of interest to members to know what Mr. Gray fed his crabs on whilst under observation.—Ed.)

ST. ANDREW'S CROSS SPIDER, *Argiope aetherea.*

(Communicated by F. Chamberlin.)

The accompanying illustration was sketched by Mr. A. Scott, of Maroubra, who collected the specimen in a garden of that suburb. After making the sketch, Mr. Scott damaged the web to see whether another of similar pattern would be spun, but the spider has since made another much smaller web, with only one bar across the portion usually occupied by the cross.

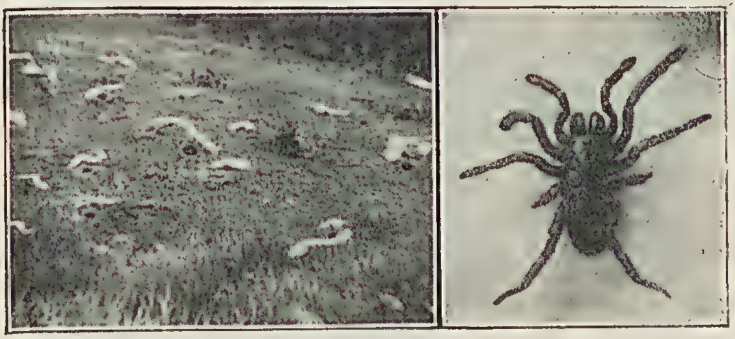


W. J. Rainbow, in his "Notes on the Architecture, Nesting Habits and Life Histories of Australian Araneidae" (Rec. Aust. Museum, Vol. 7, No. 4, 1909, pp. 214-215),, wrote as follows: "From the time when the young Argiope spreads its first orbicular snare, the zig-zag ribbon (St. Andrew's Cross) is present, but it is always much more highly devèloped in the webs of adults." "Personally, I am inclined to the opinion that it acts as a support to the central space and hub, and also that it materially assists in bearing the weight of the spider's body."

NOTE ON A TRAP-DOOR SPIDER, *Arbanitis fuscipes.*

By S. A. Howell.

About the middle of March, Miss Jean Hill, of Lane Cove, inquired whether I knew the poisonous trap-door spider. I visited her garden where she had dug out several specimens which were later identified by Mr. A. Musgrave, of the Australian Museum, as *Arbanitis fuscipes.* This species of the "trap-door" group does not construct a door or lid to its tunnel, but I noticed, when digging for further specimens, that most of those in the open leaned slightly towards the south-east. The tunnels, some of which reached a depth of two feet, were more numerous in the cultivated parts of the garden. The spiders were always facing upward, with the front pair of legs raised in fighting attitude.



There were hundreds of nests about the garden and many along the dividing fences and about out-houses, and in one out-house, with an earthern floor (about 6 feet by 4 feet), we found some twenty nests.

The accompanying illustration of an area about five feet by four feet shows how close the nests were, marked by strips of paper.

The spider illustrated is a female example of *Arbanitis fuscipes;* about two-thirds natural size; the third pair of legs are foreshortened.

In a garden close by I found a specimen of *Atrax robustus,* the known poisonous species which has been recorded biting man. This species also has no lid to its tunnel.

NATURALISTS' SOCIETY OF NEW SOUTH WALES.

Proceedings.

MAY, 1930.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, May 6th.

The President (Mr. David G. Stead), in the chair.

The Secretary tabled printed copies of the speech delivered by Sir Joseph Carruthers, M.L.C., in the Legislative Council, on the second reading of the Birds and Animals' Protection (Amendment) Bill.

Exhibition of Specimens.—Master John Ludowici, specimens of the paper nest of the wasp, *Polistes,* and of the Black and Red wasp's nest, made of mud, better known as Mud Daubers, *Odynerus,* sp. These were identified and explained by Mr. Luke Gallard.

Mr. John Powell.—Specimens of the Blue Ant wasp, *Diamma bicolor,* identified by Mr. Gallard, and fruit of melon found amongst the native flora.

Mr. Gallard.—Specimen of the wingless orchard moth, *Notolophus (Teia) anartoides,* and also female of the several stages of a Bibionid fly.

Miss McAnene.—Specimens of Brachyscelid galls; operculum of shell from one of the Pacific Islands, and the Osage orange, *Maclura aurantiaca,* of the United States.

Miss Heyner.—Nests of the Blue Silver Eye Lark, Flame Breasted Robin and Yellow-faced Honeyeater.

The Treasurer's statement was tabled, showing a credit balance of £54/5/6.

Lecture.—Mr. J. R. Kinghorn, C.M.Z.S., Zoologist to the Australian Museum, gave an informative and educative lecture on "Faunal Problems," profusely illustrated with lantern slides.

JUNE, 1930.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, June 3rd.

The President (Mr. David G. Stead), in the chair.

Correspondence.—Letter from Chief Secretary's Department, saying, with reference to the destruction of opossums, that where it can be shown that they are proving destructive to crops, etc., on any holding, the proprietor would be granted a permit to kill a limited number on his property.

Letter from the Curator, Beaumaris Zoological Gardens, saying that the Tasmanian wolf will not breed in captivity.

Letter from Mr. G. Park, asking to be furnished with a license to pick protected plants for scientific purposes. The Secretary was authorised to write to the Minister of Local Government, recommending that such a license should be issued.

Letter from Mr. N. C. Hewitt offering his new No. 8 Premier projection optical lantern for sale.

Letter from Mr. Eric C. Humphries, of "Burrator," Scotland Road, Chesterton, Camps., England, asking to be put in touch with a shell collector with whom he could make exchanges.

Donation.—The Secretary reported the arrival of Dr. Leach's book on "Australian Birds," very kindly donated to the library by Mrs. S. A. Howell.

Resignation of Mr. Wm. Stables was accepted with regret.

Exhibition of Specimens.—Master John Ludowici: Leaves and nuts of *Macadamia terminalis;* fruit of *Endiandra globosa,* and preserved specimen of the Bandy Bandy snake, *Furina annulata.*

Mr. Gray.—Live specimens of the Paradise fish, which had been captured in a waterhole at Fairfield, N.S.W.

Mrs. Howell.—Specimen of the Trap-door spider, *Atrax robusta.*

Lecture.—The President, Mr. David G. Stead, delivered a highly interesting and instructive lecture upon the "Life History of the Oyster," illustrated by a fine set of lantern slides.

JULY, 1930.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, July 1st.

The President (Mr. David G. Stead), in the chair.

Correspondence.—The Town Planning Association of N.S.W. wrote requesting the Society to send delegates to the League of Nations' Union Council Chamber, on June 26th, to discuss the first steps to be taken to secure for the future our parks and playing grounds from further alienation. (The President attended the said meeting, and reported upon the deliberations of those attending).

The Wild Life Preservation Society of Australia wrote asking the Society to write to the Minister of Lands, advocating the establishment of a great National Park in the Guy Fawkes area. (Their request was acceded to).

The Committee of the Field Naturalists' Club of Victoria invited the President as representative of the Society to attend their jubilee dinner, to be held at the St. Kilda Town Hall, on Wednesday, July 16th.

The Director of the Tasmanian Museum and Art Gallery wrote saying that Mr. C. Pitman, of the Lands Department, had agreed to exchange shells with Mr. Eric C. Humphries, of England.

Mr. Leslie V. King wrote asking where gold fish may be obtained. (The President agreed to furnish the desired information direct).

The Librarian of the Commonwealth Forestry Bureau, at Canberra, wrote asking for a complete set of the Australian Naturalist Journals. (The request was acceded to).

The Minister of Local Government replied that permits to pick protected wild flowers would be issued in favour of Messrs. G. G. Park and R. A. Black, after the publication of the new Proclamation.

New Members.—Mrs. F. J. Ludowici, 117 York Street, City; Mr. Herbert Royce, 16 Hercules Street, Dulwich Hill.

Resignation of Miss Eva Nairn was accepted with regret.

Treasurer's statement was tabled, showing a credit balance of £52/11/10.

Exhibition of Specimens.—Mr. L. Gallard: Statement of particulars in connection with two years' breeding of *Chelepteryx felderi*, Turn. He was associated with Mrs. S. A. Howell in this work.

Mr. A. E. Watson tabled a list of plants observed at Nielsen Park.

Mr. J. Powell reported upon his visit to Queensland, where he obtained oil bearing sandrock, taken from No. 17 bore, near Roma. (Exhibited to members). A number of fossils, showing plant life found at Bymount, near Roma, belonging to the Walloon series, located in a freshwater deposit of silicious shales of the Jurassic period; photographs showing the boring operations around Roma; specimens of *Cactoblastis* that is so effectually destroying the prickly pear in Queensland.

[Editor's Note: Mr. W. B. Gurney, Government Entomologist, advises that the caterpillars of the moth, *Cactoblastis cactorum,* as well as the sucking Cochineal insects, *Dactylopius,* sp., are proving of great value throughout New South Wales, as well as Queensland, in the destruction of prickly pear.

In the north-western districts of this State, and to a lesser extent in the southern portions, large areas are now freely infested and being reduced by these insects.

Some 290,000,000 eggs of these Cactoblastis moths have already been distributed throughout New South Wales, and increasingly spectacular results in the reduction of prickly pear are expected from the moth caterpillars during the next two years.]

Miss Howieson exhibited a germinating cocoanut and a flowering branch of *Eucalyptus sideroxylon.*

Mr. G. G. Park.—Specimens of *Epacris longiflora, Hardenbergia monophylla.*

Master John Ludowici.—Specimen of shell of the Hammer oyster, collected at Woy Woy, and the fruit of the Osage orange, *Maclura aurantiaca.*

Mrs. S. A. Howell.—Specimens of immature larvae of a case moth, which was injuring the leaves of *Tristania conferta.*

Lecture.—Dr. G. A. Waterhouse gave a very fine illustrated lecture, entitled, "Australian Butterflies." The lantern slides depicted butterflies in most natural colours.

The President extended, on behalf of the members, a hearty welcome to Mr. Fred. H. Bryce, who had just returned from a trip to Europe.

NOTE ON PARADISE FISH.

(*Macropodus opercularis,* Linn.)

The specimens of Paradise fish exhibited by me at the June meeting were secured by Mr. V. Gadd, of Newtown, in a large waterhole at Fairfield, N.S.W., about the middle of April, 1930.

They prefer live food, being particularly partial to mosquito larvae and rather keen on tadpoles. I have never observed them eating prepared foods, but occasionally they will nibble a worm.

Two of the Chinese variety of Paradise fish, only half the size of the locally captured specimens, will attack worms voraciously and sometimes carry off worms three times their own length. When attacking they always dart on the worm, whereas the local forms approach one with great caution.

—M. E. Gray.

PARADISE FISH GONE WILD.

Following upon the exhibit by Mr. M. E. Gray, at the June meeting, of some specimens of the Paradise fish, *Macropodus opercularis,* the President, Mr. David G. Stead, drew the special attention of members to the fact that here we had an instance of an exotic fish in active process of acclimatisation in Australia.

Originally, and for many years introduced purely as an aquarium fish, this species had at length succeeded in establishing itself in a wild state. It remained to be seen whether it would prove friend or foe in our waters. While a mosquito eater of importance, it was not of such value from this point of view, as, say, our own *Galaxias*, which, because of their slender build, were able to insinuate themselves into all sorts of shallow places in pursuit of the larvae.

The President invited members to keep a lookout for any further evidences of the spread of this species. It is one of the best kinds for observation in the aquarium. It will be of importance to note what effect (if any is apparent) this fish will have upon the fauna of the freshwaters which it inhabits here.

BOOKS FOR BEGINNERS—A SUGGESTION.

Mr. Keith Norman, in a letter to the Hon. Secretary, writes with regard to books published for beginners in the elements of various branches of science, and offers the following suggestion:—

"I suggest that it might be useful if the Society were to take upon itself the task of persuading our Australian publishers to insist upon the provision, in all works of a popular or semi-popular character, of some means whereby the public for which these books are primarily intended, may be able to be sure that they are not blundering in their use of words. This means would, presumably, consist of a phonetic annotation of the index. There would seem to be no particular difficulty about this: and I, personally, am convinced that the value to the public of, say, the two wild flower books, by F. Sulman, or of some of Dr. Leach's books would be greatly enhanced if some such course had been followed."

BADGES.

Members may now obtain the Society's Badge from the Hon. Secretary (Mr. R. A. Black, Box 2178 L.L., G.P.O., Sydney) for 2/- (postage and package extra), or from the Hon. Assistant Secretary (Miss Dolce Dobbin, c/o Bank of New South Wales, William Street, Sydney).

Members are respectfully reminded to take notice of Rule 4 of this Society, which reads: "All subscriptions shall become due on the first day of August, and shall be payable in advance."

Owing to lack of space, several papers are being held over for the next issue.—Ed.

The Australian Naturalist

Vol. VIII. OCTOBER, 1930. Part 4.

SARDINES, PILCHARDS, HERRINGS AND ANCHOVIES.

Australia's Vast Untapped Fisheries Resources.

By DAVID G. STEAD.

(Presidential Address, given at Annual Meeting of the Naturalists' Society of N.S.W., August 5, 1930.)

In common with a great part of the world at the present time, Australia is passing through times of financial depression. At no time in the past was it so necessary as now to harness and develop the latent resources of the country. Nominally, that is recognised on all sides, but actually it is not at all; for, notwithstanding the expert and reliable advice of the scientific investigator, we persist, as a people, in turning a blind eye to resources of such magnitude—that if developed would add immensely to the wealth and the natural food supply of this Commonwealth —at the same time providing employment for thousands of our people and adding many hundreds of thousands of pounds sterling to the money in circulation in the country, instead of sending it overseas.

We are prone to look to some wonderful discoveries in oilfields, or some remarkable "come back" in metalliferous mining to assist us out of our financial "slough of despond." We send out prospecting parties every here and there to discover perchance some veritable Cave of Aladdin, while all the time the fisheries scientist is knocking on the door of a nation that will pay no heed, notwithstanding that he is pointing the way to the most prolific fields for primary (and secondary) developmental work.

In many places and in diverse ways during the last thirty years it has been your President's privilege to indicate the directions in which great economic developments in fisheries might take place in various parts of Australia. A recent reference was made to the great possibilities of the northern Australian waters, where, over some thousands of miles of coastline, are vast fisheries—quite neglected—awaiting development, and with an avid market of millions of consumers (already familiarised with the very kinds of fishes occurring there) right at our doors *. Bottom fishing in the open sea has received some attention in Australia, and has been developed, mainly by means of the otter trawl net, on the coast of New South Wales; but it is quite in its infancy and is capable of great developments on several thousands of square miles of ocean bottom adjacent to the Australian coasts—particularly in waters south of the 30th parallel of latitude.

OUR PELAGIC FISHERIES.

There is a fisheries region in Australian waters, however, which has barely been touched commercially up to the present. Indeed, notwithstanding what has been written about it, this field remains—as far as exploitation is concerned—just as much a terra incognita to-day as it was fifty years ago. I refer to our pelagic or open sea surface fisheries. Beyond a certain amount of surface line fishing such as that for the Barracouta (*Thyrsites*), around Tasmania and Bass Strait, and a little isolated trolling for game fishes here and there, these prolific fields remain untouched. The kinds of fishes (of a commercial order) affecting such areas fall mainly into two great groups: (1) The Mackerel kind and their allies, the *Carangidae* or Yellow-tail group; and (2) the great variety of shoal fishes that we may group broadly under the names of Herrings or Sprats, and included in the family *Clupeidae* and its allies. Notwithstanding the great prospective value of the Mackerel and Tunny fisheries, the second group that I have mentioned is destined to play by far the more important part in our future fisheries development, as it contains many kinds of Sardines, Pilchards, Herrings and Anchovies, a number of which abound in almost inconceivable and inexhaustible numbers throughout the waters of thousands of miles of our coastline.

So important are these surface fisheries, potentially, that it may be said with perfect safety that, however great may be the development of our bottom fisheries by means of trawling and other forms of ground fishing (and I expect such development to be very great indeed), the pelagic fisheries will ultimately tower above them, both in value and in the total tonnage of edible or other commercial fish brought in.

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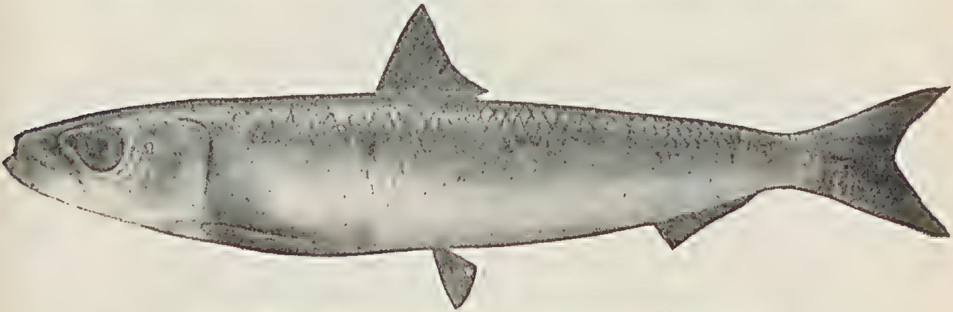
* Presidential Address to the Geographical Society of New South Wales; "Australian Geographer," Vol. 1, Part 2 (1929), pp. 3-25.

Such a fishery will be conducted mainly with large floating nets like the purse-seine, or varieties of drift-nets set right at the surface or floating at varying depths below. Some of these nets would be of very small mesh, such as those used by the Norwegians in their capture of the small herring kind known variously as Norwegian "sardines," "sprats," "sild," or "brisling." In the more northerly or tropical waters of Australia, especially in heavy tideways and on broad reefy shallow grounds, great execution would be done with fixed nets streaming out in the tide and intercepting the shoals of fish as they move down the tide. This form of fishing has been mentioned in my paper in the "Australian Geographer," previously referred to.

AUSTRALIAN HERRINGS AND THEIR ALLIES.

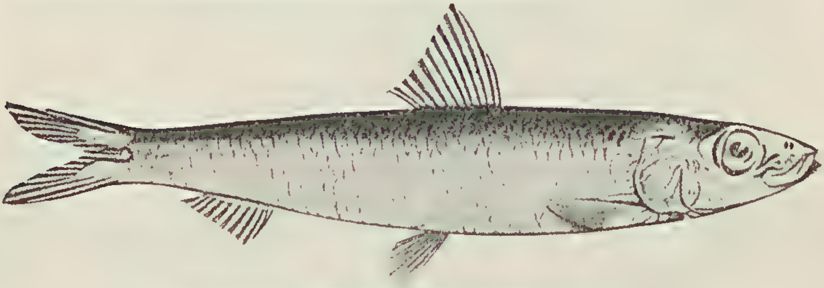
The main object of the present address is to draw attention once again to the extraordinary possibilities in the way of fishery industries based upon the capture of one or other of the species of the herring family in Australian waters. Approximately 40 species of the herring type are known from the waters of Australia, ranging from tiny Sprats of two inches in length up to the huge Giant Herring of four feet in length. An important fact in relation to these herrings—important alike to the fisheries investigator and the economist—is that at certain seasons most of them are found in shoals of tremendous magnitude. This renders their capture and ultimate treatment in fish "factories," a far more practicable thing from a commercial standpoint than if they were to remain diffused widely throughout the waters during the whole of their life period.



Australian Pilchard, *Sardinops neopilchardus.*

While a number of kinds (especially the larger forms) are more peculiarly tropical in habitat, some are more or less restricted to the southern half of our coastline. But practically all have a distribution covering at least some thousands of miles of coast. The larger forms do not enter much into my present discussion, and I propose to restrict myself chiefly to a few kinds, forming a group similar to certain imported herring kind for which Australia pays away literally hundreds of thousands of pounds sterling per annum; when, with a comparatively little preliminary expenditure, we might not only supply our own needs, but those of some other parts of the world as well.

At the end of this address I have furnished a full list of Australian herrings of various families as at present known, and from these I now select the following kinds as being of first-class importance at the moment: (1) The Pilchard, *Sardinops neopilchardus* *; (2) the Blue Sprat, *Stolephorus robustus;* (3) the Maray, *Etrumeus jacksoniensis;* (4) the Southern Herring, *Harengula castelnaui,* and (5) the Common Anchovy, *Engraulis australis.* Among the other kinds listed there are, no doubt, several which will be found to be quite as important as those which I now specially mention, but data regarding their actual numbers and periodicity is lacking at present.



Blue Sprat, *Stolephorus robustus.*

The Pilchard is of outstanding importance and is very widespread—not alone in Australian waters, but in Japan and east coast waters of the United States. I mention the two latter to still further impress our people with the fact that this clupeoid fish, which occurs in our waters in shoals of vast magnitude, is actually imported into Australia to the extent of thousands of cases of tins annually, under the name of "Californian Sardines," or "Japanese Sardines," or "Herrings," according to the size and general get-up. A very large industry might be built up in Australia in the pursuit and preparation in various ways of this fish alone, which is among the choicest of the world's sardines, or "sprats," according to the age of the fish. Ordinarily occurring, all the year round, diffused throughout the entrance waters of our estuaries and bays, this fish at times is found in such large-sized shoals as to be beyond calculation. As recorded elsewhere, I, myself, have passed through such a shoal, covering 30 miles of water off the coast. While these great shoals are mostly met with at sea, they frequently penetrate the lower waters of the bays and harbours. There have been many such visitations in Port Jackson, which have come under my notice; some of them quite recently.

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* Although there may be some differences of opinion concerning the application of certain of the technical names, I have thought it advisable to follow, in the main, McCulloch's "Check-List of the Fishes Recorded from Australia" (Pt. 1, 1929).

Among many records which I placed before the Royal Commission of Food Supply, in New South Wales, in 1912, will be found a selection from about 150 noted occurrences of the Australian Pilchard in just a few places on the New South Wales coast alone. These relate to shoals of varying sizes and containing either full-grown or young fish. The fish attains about nine inches in length. Those about half-grown—say four inches long—are very like the larger Sild or Brisling of the Norwegians, and when canned or pickled are scarcely separable from them.

One record of this fish that I have mentioned elsewhere is worth repeating: In May, 1911, a mound of these was washed up at Yamba Beach (entrance of Clarence River). This mound was about 150 feet in length, 30 feet wide and 3 feet high. It contained many hundreds of thousands, yet it was only a fraction of the shoals that were present at the moment. On another occasion a shoal was chased ashore by larger fishes on a beach south of Wollongong, forming a mound about two miles in length and about two feet high. There are many records of the harassed Pilchard rushing ashore in their terror.

Here then we have a known commercial "sardine" occurring in incalculable numbers in our waters, frequently thrusting themselves under our notice and almost asking to be caught; while, in the meantime, we import many thousands of pounds worth per annum of the same fish. A recent occurrence of the fish is typical: One afternoon Watson's Bay, near the entrance to Port Jackson, was filled to overflowing with Pilchard. A boat crew using the ordinary short garfish net captured three large boat loads. But only a few could be sold at the fish markets—to be used fresh and smoked only as there was no local cannery handling such products. When these fish are massed in their shoals, it is frequently possible to dip them out of the sea with baskets.

As a food fish the Pilchard is delicious, canned or

Maray or Sardine, *Etrumeus jacksoniensis.*

pickled. I have had them prepared, "fresh," in oil, bottled and converted into "bloater" and "anchovy" paste, with equally excellent results. But, as I have said, the fish is already widely known through our importations from other lands! When we really wake up to its value a very large industry will result in Australia—especially in New South Wales and Victoria.

The Blue Sprat is a small sardine or sprat (*) inhabiting abundantly coastal waters of Queensland, New South Wales and Victoria. At almost any time very large quantities may be obtained in the entrance waters of bays and estuaries and in the surface portion of ocean shallows over sandy bottoms. They commonly swim at from three to six or eight feet below the surface. But when shoaling during the spawning period they are crowded more at the surface. They are commonly about three inches in length, of a bright silvery appearance, and in every way similar in appearance to the Brisling or Sprat or Sild (whatever they may be termed) of the Norwegian fish packers. Not only is there this surface appearance, but the fish when treated in cans or pickled is in every respect like the delicious Norwegian fish that has such a high reputation throughout the world, and which is imported in such great quantities to Australia.

Some years ago I made a large exhibit of bottles of these Sprats in various parts of Sydney. These attracted great attention at the time and many inquiries were made concerning them. A number were also sent to Norway and to Scotland, pickled in brine. These were extremely well commented upon and *great surprise was expressed by the packers that Australia did nothing towards the exploitation of such a valuable fishery seemingly preferring to have the fish brought all the way across the world, in cans, in bottles and in barrels, or put up as fish paste, rather than to have them treated here and so provide a useful outlet for Aus-*

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* These terms are rather trade names than zoological distinctions, as commonly used.

tralian capital and employment on a large scale for Australian men and women! This aspect of the case was strongly put to me while I was investigating similar fisheries at the great canning centres of Stavanger and Bergen, in Norway. I had a number put up in olive oil also in Sydney, and, although these were prepared under my direction, only by a meat-canner, unfamiliar with the special treatment, they were quite delicious.

The Maray is found in open waters on the coasts of New South Wales, Victoria, South Australia and the southern part of Western Australia. It may be looked upon as particularly a southern species, and is especially abundant in the waters of Port Phillip. Indeed, it is quite well known in the Melbourne market, though no attempt has so far been made to treat it on any large scale. This is a very fine commercial sardine, growing commonly about six inches in length. As treated for canning, with head removed, it makes a fish about the same size as the well known French sardines of Louis Trefavenne. It has a most delicate flavour.

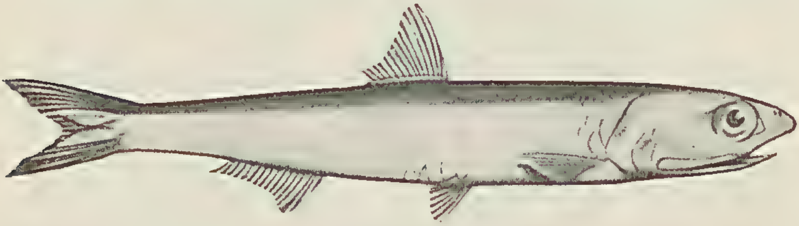
It should be mentioned here that the name of Maray is also sometimes applied to the larger Pilchard, but it should be properly applied only to *Etrumeus jacksoniensis.*

The Southern Herring is a deep-bodied fish of the sardine type. The adult fish are of as much as nine inches in length, though most commonly they are less than that. Ordinarily, this herring is found spread out in the upper waters of the estuaries of the coasts of Queensland, New South Wales and perhaps the east coast of Victoria, but at times large shoals appear in our open coastal waters. Though not such an important fish as the Pilchard nor of such edible excellence, this herring is destined to become of great importance in our future fisheries for canning purposes. Fishes of an almost identical kind are at present

Southern Herring, *Harengula castelnaui.*

canned in Japan and California, and are of high value. Some that I had canned a few years ago were very similar to these Japanese and Californian kinds.

The Common Anchovy which is always with us, like the other species of the herring kind found in our seas, is found at times in enormous shoals. Though this valuable little fish is generally found distributed throughout our estuarine waters, it is most abundant at sea, where it occurs at varying depths in the ocean water at from a fathom or so below the surface down to several fathoms deep. Occasionally it is found at even sixty or seventy fathoms, but this is not general. It grows to about three inches or more in length, and may be recognised by the deep-cut gape of the mouth, the pointed snout and the presence of a broad silver band down each side.



Common Anchovy, *Engraulis australis.*

As I have stated elsewhere for all practical and economic purposes, there is no difference between this common Australian Anchovy and the well known fishes of that name which occur in the Mediterranean Sea. (Indeed, it is very difficult to separate them ichthyologically). Yet we import the latter in large quantities in various forms. The Anchovy is found in the waters of each State of Australia, but appears to be most abundant in south-eastern parts. I have used the term "common" Anchovy here to separate the species from the several others found on the Australian coastline; chiefly on the northern parts.

There is a very great opportunity for Australian enterprise and resource in developing this anchovy fishery. A convenient place to make a start would be in Port Phillip where the fish is common all the year round—and is known by the "drag-net" name of "Whitebait."

In addition to these five species that I have mentioned and on which a great Australian canning and pickling industry might be built, there are several other kinds of sprat-like fishes of very considerable potential importance. One of these is the delicate Sandy Sprat, a little sardine of three to four inches long, which is always abundant off our ocean beaches. It is one of the many small fishes locally termed Whitebait.

The Open Door to Wealth.

Here then are industries, not new in the world, lying latent awaiting the application of energy and understanding. Australians have so often proved that they are not lacking in energy or in resourcefulness that it makes one marvel at the lack of understanding of resources that are so patent. One might understand our lack of governmental and commercial interest if we did not already consume such extraordinarily great quantities of exactly similar fish—in cans, pickled, smoked, and so on—but when we examine our records and find out what our importations really are, one is staggered at our crass dullness. I can term it nothing else!

To give point to this I will briefly refer to some figures based upon some returns kindly prepared for me by my friend, Mr. W. H. Barkley, Collector of Customs, Sydney:—

(1). In the three years embracing the period 1926-27, 1927-28, 1928-29 canned or bottled fish classified as "Herrings" was imported into Australia to the extent of 14,355,230 lb., valued at £377,563. *Allowing for a local demand for some specific brands, almost the whole of this could be supplied from Australian sources.*

(2). In the same period sardines—including Sild, Brisling, etc.—imported, totalled 7,475,032 lb., valued at £445,248. *The whole of this could have been obtained from Australian sources!*

(3). In the same period again "other" fish, including Pilchards (those not already included in "Herrings") Anchovies, etc., were imported to the total amount of no less than 13,238,884 lb., valued at £787,038! *The whole of this could have been supplied from Australian sources again, employing Australian workmen and Australian capital.*

(4). In addition to the foregoing there was a quantity of 2,299,584 lb., set down as "not elsewhere included," which includes a miscellaneous assortment of fish preparations, made from the same type of fishes, and all of which could have been procured and prepared in our own country.

This vast total of thirty-five millions pounds weight of small canned and bottled fish was valued at £1,609,839—this representing the money sent overseas by a generous and thoughtless Australian public, who do truly believe in "carrying coals to Newcastle."

Even then I have not told the whole story, for these great totals do not include either salmon or "potted" fish, or smoked and dried fish or "fresh" fish, together totalling many more millions of pounds weight and for most of which we could have produced either the most effective substitutes here or in many cases the same fish exactly!

It appears to me that there never has been a time in our history as Australians when such facts as I have here chronicled should stir us into immediate action; for here we have truly the open door to wealth and an end to many of our difficulties. I trust that these few words will reach the understanding ear of those whose duty it is to guide our governmental and commercial destinies. Certainly, it is of little use for the naturalist-investigator to go on year after year accumulating knowledge unless the country is going to make use of such knowledge to assist it economically.

LIST OF AUSTRALIAN HERRINGS.

1.	*Elops hawaiensis* (Regan) (? *Elops saurus*, Linn.). Giant Herring	N.
2.	*Megalops cyprinoides* (Brousonnet). Ox-eye or Big-eyed Herring	N.
3.	*Albula vulpes* (Linn.). Lady Fish	N.
4.	*Chirocentrus dorab* (Forskal). Dorab of Wolf Herring	N.
5.	*Dussumieria hasseltii* Bleeker. Northern Sardine.	N.
6.	*Etrumeus jacksoniensis* (Macleay). Maray	S.
7.	*Stolephorus robustus* Ogilby. Blue Sprat	A.
8.	*Stolephorus delicatulus* (Bennett). Sprat	A.
9.	*Clupea profundus* Saville-Kent. Herring	N.
10.	*Clupea torresiensis* Saville-Kent. Herring	N.
11.	*Clupea ranelayi* Saville-Kent. Herring	N.
12.	*Clupea bassensis* McCulloch. Herring	S.
13.	*Clupea schlegelii* (Castelnau). Herring	N.
14.	*Clupea macrolepis* Steindachner. Herring	N.
15.	*Sardinella abbreviata* (Cuvier and Valenciennes). Herring	N.
16.	*Sardinella fasciata* (Cuvier and Valenciennes). Herring	N.
17.	*Harengula bulan* (Bleeker). Herring	N.
18.	*Harengula castelnaui* (Ogilby). Southern Herring.	S.
19.	*Harengula konigsbergeri* Weber and De Beaufort. Herring	N.
20.	*Harengula punctata* (Ruppell). Herring	N.
21.	*Harengula kanagurta* (Bleeker). Herring	N.
22.	*Sardinops neopilchardus* (Steindachner). Australian Pilchard	A.
23.	*Potamalosa richmondia* (Macleay). Freshwater Herring, River Sprat	F.S.
24.	*Hyperlophus vittatus* (Castelnau). Sandy Sprat	S.

25. *Hyperlophus translucidus* McCulloch. Sandy Sprat. S.
26. *Neosteus ditchela* (Cuvier and Valenciennes). . . . . N.
27. *Nematalosa come* (Richardson). Hairback Herring. N.
28. *Nematalosa erebi* (Gunther). "Bony Bream." . . . . F.
29. *Chanos chanos* (Forskal). Salmon Herring or Milk-Fish . . . . N.
30. *Engraulis australis* (White). Common Anchovy . . S.
31. *Scutengraulis hamiltoni* (Gray). Anchovy . . . . N.
32. *Scutengraulis mystax* (Bloch and Schneider). Anchovy . . . . N.
33. *Anchoviella heteroloba* (Ruppell). Anchovy . . . . N.
34. *Anchoviella carpentariae* (De Vis). Anchovy . . . . N.
35. *Anchoviella nasuta* (Castelnau). Anchovy . . . . N.
36. *Anchoviella waitei* (Jordan and Seale). Anchovy . . N.
37. *Anchoviella indica* (Van Hasselt). Anchovy . . . . N.
38. *Anchoviella aestuaria* (Ogilby). Anchovy . . . . . . N.
39. *Thrissocles setirostris* (Broussonet). Anchovy . . . . N.

Note.—"N" signifies that the species is mainly northern in habitat. "S," southern. "F," freshwater. "A" means that the species is found abundantly in all States.

Illustrations of Pilchard and Herring are from author's photographs; those of Maray, Sprat and Anchovy are from McCulloch's drawings.

GILGOIN METEORITE: The specimen exhibited was one of about ten pieces, which were collected over a radius of four square miles on Gilgoin Station, Brewarrina. Mr. Allan Yeomans records that the first piece was found about 44 years ago on the open plains near Cuddy Springs.

There are seven specimens in the different Museums, and when I obtained mine, at the homestead from Mr. Geoffery Yeomans, in 1915, there were several other specimens stored under the house. Several specimens have been scientifically described in the Records of the Australian Museum (vol. x., No. 5, p. 59), Proc. Roy. Soc. of N.S.W. (vol. xxxvi., p. 352), and the Rec. of the Geological Survey of N.S.W. (vol. ix., p. 166). Analyses given show that it consists chiefly of iron, silica, and magnesia.—W. W. Froggatt.

THE QUANDONG TREE.

By Walter W. Froggatt, F.L.S.

The Quandong is one of the daintiest and most graceful scrub trees of Australia. It has a wide distribution, not only over our own westland forests, but over all the inland forests of our Australian States, and is quite unique.

Firstly as a fodder tree. Its soft, slender leaves were much relished by Ernest Giles' camels, when they first found it in Central Australia. Horses and cattle are particularly fond of the foliage of this tree, and tear down the branches to get at the leaves. Sheep eat off the seedlings, and consequently the Quandong is a vanishing tree in heavily stocked country.

On this account it is exempted from the operations of forest permits in New South Wales, and timber-getters are prohibited from cutting down or destroying it.

Again, this handsome tree bears a brilliant red fruit, which under scientific cultivation should become valuable commercially. This fruit also contains a round deeply pitted nut, of a fair size, easily cracked, equal in flavour to a filbert. If such a tree as this had come under Luther Burbank's notice, he would in all probability have subjected it to intense cultivation, and made of it a commercial proposition.

Major Mitchell, writing in 1839, says: "But in all the scrubs on the Murray, the *Fusanus acuminatus* is common, and produces the Quandong nut (or kernel) in such abundance, that it and gum acacia may in time become articles of commerce in Australia."

Dr. Leichhardt, in 1844, somewhere on the west of the Condamine River, in southern Queensland, said: *"Fusanus* was abundant and in full bearing (October 26th); its fruit (of the size of a small apple) when entirely ripe and dropped from the tree, furnished a very agreeable repast. The rind, however, which surrounds the large rough kernel is very thin."

Ernest Giles, in "Australia Twice Traversed," says: "In 1872, near Mount Uder, Central Australia, we passed several Quandong trees in full fruit, of which we ate a great quantity; they were the most palatable and sweetest I have ever eaten."

Baron von Mueller, in his "Select Extra Tropical Plants," says: "The Quandong—desert country of extra tropical Australia. The fruits of this small tree are called native peaches, as both the succulent outer part and the kernel are edible. It is advisable to raise this plant in desert tracts."

In "Useful Native Plants," Maiden writes: "The fleshy pericarp which envelops the seed known as the Quandong makes an excellent subacid preserve and jelly. It is somewhat of the flavour of the black guava." He also notes that oil has been extracted from the timber, and the texture of the wood is very close, hard and fine.

Schomburgh, in his "Flora of South Australia," remarks "that the native currant and the Quandong are all that South Australia can boast of as native edible fruits."

Turner, in his "Forage Plants of Australia," gives a general account of this tree, and particularly its value as an edible stock plant. Speaking of the fruits, he says: "The kernels too are edible, and have a very pleasant flavour. They contain a great amount of oil which, on being burnt, gives a good light."

Moore, in his "Woods of New South Wales, 1870," includes the Sandalwood and Quandong trees among the timbers suitable for wood engravers. In north-western Victoria, years ago, when Quandong trees were plentiful on the sand hills, and in the open scrub, the free selectors gathered the fresh fruit to make into tarts and pies; and also converted them into a very good bush jam.

Bennett, in his "Gatherings of a Naturalist, 1860," gives a popular description of the Quandong, illustrated with wood-cuts. He says: "The stones of the Quandong are mounted in gold as shirt pins, ladies' braclets, etc.; they are also mounted in silver, and made into stud buttons for gentlemen."

Country lads carved the Quandong nuts into little baskets to hang on their watch chains, or cut them down into rings for their neckties. The more ambitious boys often employed their leisure hours over the camp-fire in burning holes through them, to string them together into necklaces, to present to their girl chums. At the station homestead, it was usual to keep a bag of Quandong nuts for counters, when playing speculation and other card games.

The Quandong, as previously noted, is confined to the western red soil flats and sandhills, and has developed under the semi-arid conditions of these wilderness lands. It can withstand the hottest winds of the interior and the longest drought.

It is one of the smaller scrub trees, seldom growing much over twenty feet in height. Its stem is slender, varying from six to eight inches in diameter, and has slender, slightly drooping branchlets, bearing narrow-pointed yellowish green leaves, from two to three inches in length. The clusters of small white star-shaped flowers are situated on the tips of the branchlets. Bennett says: "The flowers are small, of a white colour, and agreeable scent, compared by some to that of the lily of the valley." The fruits, hanging in bunches of three or four, are spherical, at first green, then pale yellow, and finally bright red; when well grown and ripe about an inch in diameter.

It is the shell inside the fruit and containing the kernel that is known to most people as a Quandong. Immediately beneath the skin and thin covering of fruit pulp, is a buff or khaki brown shell, which is spherical, with a smooth but deeply pitted surface; the pits are irregular and of different depths and form. The apex has a navel shaped scar immediately beneath the rounded calyx of the fruit; and most have a transverse suture. In ripe sun-dried fruits these sutures become a well-defined fracture, which evidently is of great assistance in the rapid germination of the seed. The broken shell is about 1/16th of an inch in thickness; it shows a curious laminated structure, due to the deep punctures from the outer surface. The inner surface of the shell reddish-brown and dotted with tiny pits. Beneath the shell the kernel is further enclosed in a jacket of dark brown brittle material, which crumbles when the shell is cracked. The seed or nut is composed of firm white matter, with a very thin brown skin.

In its natural surroundings, on the edge of the scrub, I know of no more dainty picture in our bush land than a group of Quandong trees in full fruit, late in October, or in early November. It is not unusual to find a number of young seedlings beneath the parent tree. The scientific name of this tree is *Fusanus acuminatus.* It was originally placed in the same genus as the Sandalwood trees (*Santalum*), under which name it will be found in the writings of our early botanists. It was first described by Robert Brown in 1810.

I have been unable to find any record of the date when this tree received the popular name of "Quandong," which is universal throughout the Australian States. Nor can I as yet trace the derivation of the word Quandong. In both Morris's and Webster's dictionaries Quandong is given as an aboriginal word; yet I can find no definite statement as to its origin in any work I have consulted. It has certainly been used since our early occupation of Australia; some of our explorers such as Mitchell spell it Quandang.

Early settlers gave it the misleading name of "Native Peach"; popular writers and even botanists perpetuated the unsuitable name which is now found in our dictionaries. The fruit is much more like a small round plum, both in shape and size.

The value and beauty of the Quandong tree was recognised at a very early date in our history, and its planting and cultivation recommended by our botanists.

I have consulted a number of authorities on the possibility of growing these trees from seeds, but very little has been written on the subject. Turner, previously quoted, is the only writer who has anything to say about the artificial cultivation of the Quandong. He states that the seeds should be planted, during the early autumn, or in the months of September and October, where the trees are intended to remain. Before sowing the hard shell should be cracked, otherwise the germination will be considerably retarded. He relates that plants which he germinated and had under observation made a foot of growth annually. One of the difficulties in growing seedlings is to obtain ripe seeds. Mr. Kessell, the Conservator of Forests in Western Australia, informs me that the seed should be obtained direct from the tree, when the fruits are perfectly ripe, and then stored in a cardboard box for a few months to dry.

In answer to my inquiry as to the parasitic habit of the young seedlings, Mr. Kessell says: "The Quandong is undoubtedly of parasitic habit, but this does not affect the plant until a few weeks after germination, when the seedling requires a host plant. The seedlings will show ordinary root formation, but when the roots come in contact with those of another plant, or even one of its own species, haustoria are formed on the ends of the fine roots, and when the plant is pulled up the haustoria remain attached to the host. Our practice, in the field, is to sow the Quandongs in situ immediately under a host plant. Practically any shrub or garden plant will serve as a satisfactory host for either Sandalwood or Quandong." From the above notes it can be seen that in the neglected Quandong we have a most remarkable asset which has hitherto escaped the attention of the horticulturist. Not only is it a graceful, ornamental shrub, worthy of a place in park or garden, but a valuable fodder tree which should be extensively grown on pastoral holdings in its native habitat and protected, as is done with the Boree, Kurrajong and other edible fodder trees. It is also a fruit tree of no small value in its native surroundings, with selection and cultivation, it is capable of becoming an orchard fruit tree. Again, it is a nut-bearing tree. Authorities have stated that oil can be extracted from its timber and its nuts. Other writers have suggested that its hard, close grained wood is suitable for wood engraving and turning.

NATURALISTS' SOCIETY OF NEW SOUTH WALES.

Proceedings.

AUGUST, 1930.

The annual meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, 5th August, at 8 p.m.

The President (Mr. David G. Stead), in the chair, with 60 members and visitors present.

The Secretary read his report upon the activities of the Society during the past year.

The Treasurer submitted his annual statement, which showed a credit balance of £38/6/11. In moving the adoption of his statement, which was seconded by Mr. Gray and carried, Mr. Powell said that the expenditure had exceeded the revenue by £41/10/8.

Badges.—The Assistant Secretary (Miss Dolce Dobbin), tabled a statement of the Society's badges, which showed that 61 had been issued, leaving a balance of 239.

Lecture.—The retiring President (Mr. D. G. Stead), delivered his presidential address, entitled, "Sardines, Pilchards, Herrings and Anchovies." Illustrated.

On the motion of Mr. M. E. Gray, a hearty vote of thanks, as a mark of appreciation for his untiring and splendid services as President, was passed in favour of Mr. Stead, by acclamation.

Election of office-bearers for 1930-31:—

President: On the motion of Mr. David G. Stead, Mr. Walter W. Froggatt, F.E.S., F.L.S., was unanimously elected President for the ensuing year. Mr. Stead referred to Mr. Froggatt's valuable services to both State and Commonwealth Governments as an entomologist, and also as a foundation member of this Society.

Vice-Presidents: Messrs. David G. Stead, A. E. Watson and E. Gostelow.

Hon. Treasurer: Mr. John Powell.
Hon. Secretary: Mr. Raleigh A. Black.
Hon. Assistant Secretary: Miss Dolce Dobbin.
Hon. Editor: Mr. E. H. Zeck.
Hon. Librarian: Mr. G. G. Park.
Hon. Assistant Librarian: Miss L. Halloran.
Hon. Lanternists: Messrs. G. White and A. Booth.

Other members of the Council: Miss H. McAnene, Miss L. Steinbeck, Mrs. S. A. Howell, Miss D. Lawry, and Messrs. L. Gallard, P. E. B. Barnett, M. E. Gray, F. J. Ludowici.

Publication Committee: The President, Hon. Editor and Hon. Secretary.

The new President (Mr. W. W. Froggatt), was installed, after which he gave a most interesting account of his early entomological career and his association with several outstanding leaders of science.

New Member.—Mr. John E. Lee, National Club, Bligh Street, Sydney.

Exhibition of Specimens.—Almost the whole of the available space in the meeting room was taken up by members' exhibits, which were artistically displayed on tables.

The exhibitors included:—

Mr. M. E. Gray.—Various living fishes from China and Japan.

Mr. John Powell.—A specimen of Diatomaceous earth, taken from a quarry near Orange.

Mrs. S. A. Howell.—Specimens of Trap Door spiders.

Mr. G. G. Park.—A collection of native plants, painted in water colours by himself.

Mr. W. W. Froggatt.—A collection of insects and cut native flowers.

Miss D. Lawry.—A collection of cut native plants.

Mr. R. A. Black.—Buprestid beetle galls on *Pultenea stipularis.*

Donation.—Mrs. S. A. Howell very thoughtfully presented a "Guide to the Orchids of New South Wales" to the Society's library.

SEPTEMBER, 1930.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, 2nd September.

The President (Mr. W. W. Froggatt, F.E.S., F.L.S.), in the chair, with 50 members and visitors present.

Correspondence.—The Linnean Society notified that the first Fletcher Memorial Lecture would be delivered in the Lecture Theatre of the Australian Museum on 15th September by Mr. A. H. S. Lucas, M.A., B.Sc., entitled, "Joseph James Fletcher, an Idealist Secretary."

The Field Naturalists' Club of Victoria wrote thanking the Society for its good wishes and congratulations on the occasion of their jubilee. Their exhibition of natural history was the largest and best ever shown in Melbourne, and the attendance of the public quite exceeded all expectations.

The Wild Life Preservation Society of Australia wrote saying that the matter of all allied organisations uniting and establishing themselves under one Association; similar to the lines of those of the American Nature Association, whose headquarters are in Washington, D.C., U.S.A., would be brought up for discussion on July 29th, and requested the members of the Society to give it their earnest consideration in the meantime.

Mr. Noel Burnet, of Koala Park, now known as the Australian Native Bear Re-establishment Reserve, also being a sanctuary for native animals and birds, and Arboretum for Australian trees, shrubs and wild flowers, wrote, inviting the members to visit the Park to see the native bears and to observe the general improvements which had taken place.

The Council for Scientific and Industrial Research wrote forwarding leaflet relative to the 1930-31 grants to research workers, which are now available, subject to certain conditions.

The Under Secretary of the Lands Department wrote acknowledging receipt of the Society's letter relative to the establishment of the Guy Fawkes National Park.

The Hon. Secretary, Parks and Playgrounds Movement, wrote re movements for the reservation of adequate parks and playing spaces; that his committee would be grateful if, in the event of this Society taking any separate action to deal with the general problem, to keep his committee informed. Also to confer with their committee to avoid duplication.

Since the above request, a deputation representing the executive committee of the Parks and Playgrounds Movement waited on the Minister for Lands (Mr. Ball) on 12th August, and asked that a board consisting of the Surveyor-General (Mr. Matthews) and three or four representatives of the Movement be appointed to conduct a preliminary investigation into claims for additional playing areas and parks in the city and suburbs.

The Minister said that the Surveyor-General was investigating the matter, and upon his report the Government would act. Also that he would consider the proposal to appoint a board of inquiry.

The request of the Senckenbergische Bibliothek of Germany for back numbers of "The Australian Naturalist" was acceded to.

The Hon. Treasurer (Mr. John Powell), submitted his monthly financial statement, which showed a credit balance of £44/17/1. The Hon. Treasurer emphasised the point that many members' subscriptions were in arrears. It was proposed that a list be drawn up.

The President said that he was preparing propaganda to reach the people in the country, through their local newspapers, with a view to creating interest in the Society's activities, and hoped that such would lead to a new and numerous membership.

New Members.—Mr. R. J. Hillsmith, of "Yallambee," Firth Avenue, Homebush; Mrs. A. E. Finch, of 55 Lord Street, Roseville; Mr. A. F. Norris (please forward address to Hon. Secretary).

Animal Lovers' Retreat, 115 The Boulevarde, Her Majesty's Arcade, Sydney.—Mrs. A. L. Green, of Neutral Bay, wrote, drawing attention to this centre, where members may meet, over a cup of tea, for the purpose of discussing matters pertaining to general natural history.

Exhibition of specimens:—

Mr. G. G. Park.—Flowering specimen of the Mock Orange (*Pittosporum undulatum*).

Mr. John Powell.—Sample of starch obtained from the rhizomes of *Canna edulis.*

Mrs. S. Howell.—Flowering specimen of *Pittosporum undulatum.*

Mr. W. W. Froggatt.—Specimen of *Acacia pycnantha* in flower.

Mr. G. White.—Specimen of orchid (*Prasophyllum elatum*).

Lecture.—Mr. W. W. Thorpe, ethnologist to the Australian Museum, gave a most interesting lecture, entitled, "Our Aborigines," profusely illustrated by a fine set of lantern slides, showing the habits and customs of the natives.

The President, upon welcoming the Rev. E. R. Gribble, of North Queensland, called upon him in view of his extensive experience with the aborigines to move a vote of thanks to Mr. Thorpe, which was carried by acclamation.

OCTOBER, 1930.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, 7th October, 1930.

The President (Mr. W. W. Froggatt, F.E.S., F.L.S.), in the chair, with 45 members and visitors present.

Correspondence.—The field naturalists' section of the Royal Society of South Australia wrote making a request for a collection of wild flowers for their show, to be held on 10th and 11th October. (It was agreed, if possible, to accede to the request).

Finances.—It was agreed to specially consider the Society's finances at the next Council meeting.

Propaganda.—The President said that by special request he had sent an article to the "Sports Girl," the official organ of the City Girls' Amateur Sports Association relative to the Society's activities.

Lecture.—The President stated that Mr. A. S. Le Souef, Director Taronga Park, would give a lecture at the November meeting on "The Ancestors of the Marsupials."

Excursion.—Mr. W. W. Thorpe, ethnologist to the Austalian Museum, will act as leader, on Saturday, November 1st, to an aboriginal camp at Kurnell.

Treasurer's Statement.—The Treasurer tabled his monthly statement, which showed a credit balance of £48/18/3.

Resignation of Mrs. Morris, of 725 George Street, Sydney, was received with regret.

New Members.—The following ladies were unanimously elected members of the Society:—

Miss A. Langford, Manchester Unity Building, Castlereagh Street, Sydney; Miss E. Battley, 24 Iredale Avenue, Cremorne.

Publications for Sale.—The President announced that the Society's early Memoirs were for sale (see notice in this issue).

Exhibition of Specimens.—Mrs. S. Howell, specimen of *Exocarpus cupressiformis* in fruit.

Mr. R. A. Black showed a specimen of a plant named in honour of Mrs. Howell, namely, *Prostanthera Howellii,* which was collected at Sackville Reach, Hawkesbury River.

Mr. W. W. Froggatt.—Specimen of meteorite collected on Gilgoin Station, Brewarrina.

Prof. A. J. Abbott.—A large collection of native flowers, about which he gave an interesting account.

Mr. A. E. Watson.—Specimen of an orchid, *Galeola cassythoides,* which is semiparasitic.

Master John Ludowici.—Specimen of a beetle belonging to the genus *Paropsis.*

Lecture.—Mr. Tom Iredale, conchologist to the Australian Museum, gave a very interesting lecture, profusely illustrated, entitled, "Captain Cook and his Naturalists," for which he was accorded a hearty vote of thanks.

Mr. G. White officiated at the lantern.

BUPRESTID BEETLE GALLS: The rounded galls on the stems of *Pultenea stipularis,* exhibited by Mr. R. A. Black, at the August meeting, were formed by the larvae of small metallic coppery-coloured beetles, *Ethon affinis.* These were first recorded in the Proc. Linn. Soc. of N.S.W., in 1892, by W. W. Froggatt.

EXTRACTS FROM REPORT OF HON. SECRETARY.

RALEIGH A. BLACK.

(1929-1930.)

It is with much pleasure that I submit my annual report upon the activities of the Society.

On the whole the attendances at meetings and excursions have been very satisfactory, and the lectures delivered before members of a very high standard.

The Society is singularly fortunate in being able to secure the interest of leaders of scientific thought, thus enabling the members to keep up-to-date in the latest developments of the various branches of science.

The Council met on ten occasions during the year, there being always a representative attendance of members.

Excursions have been organised throughout the year, with the exception of the month of December. At these there were good attendances of members and visitors. Every endeavour is made to obtain the assistance of a scientific leader who is always interested in members' thirst for information. It is manifestly clear that the teaching of say botany in the delightful freshness of the bush is not only much more congenial to both the instructor and pupil than in a class room, but more effective by reason of the natural environment.

The value of our lectures is greatly enhanced by lantern slides which record a "living impression" on the human mind quicker and clearer than by word of mouth. Messrs. G. White and A. Booth, the Hon. Lantern operators, are always conscientiously at their post, and the Society is greatly indebted to them.

The Society does not confine itself merely to the abstract study of Nature. During the past year the following matters were debated and dealt with, namely:—

(a) Not to take a financial interest in "The Jungle," Mount Tomah.
(b) Protest against any portion of Nielsen Park being set aside as a parking area for motor cars.
(c) Protest against the cruel, wholesale and unnecessary slaughter of opossums.
(d) Protest against the making of a road round the foreshores of Kuring-gai Chase.
(e) Participation with other bodies in "Parks and Playgrounds Movement" to obtain the park and playground space necessary for present and future requirements.

(f) General protest, with other scientific institutions, against the Government of the day permitting the erection of a building for Agricultural Department in the Botanic Gardens.

(g) Advocating with other bodies the establishment of a Great National Park in the Guy Fawkes area of the New England plateau.

In the capacity of Secretary I would like to place on record a reference to the splendid services of the President and office-bearers. I have been particularly fortunate in being aided in my work by each and everyone. The Honorary Treasurer (Mr. Powell) has given much conscientious thought to the collection and bringing to account of the Society's revenue, and his help during the past year has been most acceptable. Mr. Powell always presented a monthly statement of receipts and expenditure to the Council at each monthly meeting.

To Mr. E. H. Zeck members are indebted for the editorial work of this Journal.

The services of the Hon. Librarian (Mr. G. G. Park) have been extremely onerous, and during the preceding year he has paid no little attention to putting the exchanges into something like order.

Mr. M. E. Gray, the publicity officer, has from time to time given assistance by writing up accounts of some lectures and excursions.

The Assistant Hon. Secretary (Miss Dolce Dobbin) has been most helpful by attending Council and other meetings during my unavoidable absence, and also by taking charge of the Society's badges and selling many of them.

In conclusion, I would like to pass a word of thanks to the individual members of the Council who have greatly assisted me in my work as Secretary during the year just concluded.

DIATOMACEOUS EARTH: The specimen exhibited at the August meeting was taken from a quarry near Orange. This earth consists of the silicious remains of millions of minute organisms deposited thousands of years ago. The sample contained about 79 % silica, 14 % moisture and 7 % of various impurities. It is used as a packing material for filtering, as an insulator for boilers and can be used with nitro glycerine for explosives. It can also be used as a polishing powder, but has a sharpness of 7.5 % as against glass of 6.7 %.—J. Powell.

Memorial to the late J. H. Maiden.—On page 55, vol. viii., pt. 3, the line, "Government Botanist, 1886-1923," should read, Government Botanist, 1896-1924.

OBITUARY.

JOHN BRAZIER.

John Brazier, conchologist, collector and field naturalist, who was born near Argyle Cut, Sydney, on September 23rd, 1842, was a collector of shells from the time he was fourteen. Both he and the late George Masters collected much general zoological material for the Australian Museum and later for the Macleay Museum.

In 1865 he shipped as gunner's mate on H.M.S. Curacao, and during a cruise in the Pacific collected much material. He was one of Macleay's staff on the Chevert Expedition to New Guinea, which left Sydney, May the 11th, 1875. He was the last foundation member of the Linnean Society of New South Wales, founded in 1875, and contributed a large number of papers on conchology between 1875-1898, and was for a number of years conchologist to the Australian Museum. He was also a vice-president of the Field Naturalists' Society of New South Wales, founded in 1890, and took an active part in its proceedings, until it was disbanded, and when our present Society was formed Brazier handed us the books of the old Society.

He died in Sydney, aged 88, on August 20, 1930.

—W. W. Froggatt.

NOTES ON EXHIBIT OF LIVING FISHES.

By M. E. GRAY.

The small aquarium exhibited by me at our annual meeting contained five pairs of fishes, namely, Wakins, Rynkins, Shubunkins, Loaches and Paradise Fish, the first three pairs being varieties of Goldfish.

Wakins, I understand, are not common in this country. They are markedly different from the Rynkins (or Fringetails), being slender bodied, like the common Carp, with very small fantails. The Rynkins possess a decidedly rounded abdomen and exceptionally well developed caudal fins. These two varieties are richly coloured, lively, active fish. The Rynkin forages in a perpendicular position, head downwards, with the tail floating gracefully over the body. Both varieties come from Japan.

The Shubunkins (or "Calico Fish") are also a Japanese variety, and not common in aquaria in this country. I only recently acquired them so know very little of their habits. In form they resemble the common Carp, but in coloration they far excel all other varieties of Goldfishes. The pair exhibited showed patches or blotches of purple, pink, white, yellow and brown, peppered with small black spots and on account of their varied coloration the name "Harlequin Fish" has been suggested for them.

The Loaches come from China. They are not gaudily coloured, having mottled green-grey markings, lithe, eel-like bodies, and circle of six barbels around the mouth. They are full of life and are fairly hardy fishes, which seem to settle down to local conditions quickly.

The Paradise Fish also comes from China, and for the most part they are rather sluggish creatures, which spend much of their time lurking amongst the weeds, but when the occasion warrants it they can move very quickly. They prefer live food and are usually pugnacious.

Note on Sea Snakes.—The Sea Snakes exhibited by me were *Hydrophis elegans* (?) and *H. ocellata.* They were secured in the Burnett River at Bundaberg, Queensland, during February and April, 1921-22, where they were common, *H. ocellata,* "The Sea Carpet Snake," being the commoner of the two. Although venomous, they appear to be harmless, as far as man is concerned. I have never heard of anyone ever being bitten by them; they are as active as a fish in the water, but quite helpless when stranded, feebly striking around in an aimless manner. Their mouths are comparatively small. The majority of those seen were between four and five feet long, but one I secured at the mouth of the river was 6 feet. When *H. ocellata* comes to the surface to breathe it raises the whole body over the surface of the water as if going up and over a fence, the tail being the last portion to disappear under the water. They swim eel-wise with great rapidity, and I have noticed them swimming alongside the launch just below the surface on many occasions.

PUBLICATIONS FOR SALE.

The Scientific Study of Scenery, with particular reference to the Grand Canyon, Blackheath, by F. W. Carpenter, M.A., 1919.

A Synopsis of the Fishes of New South Wales, by E. R. Waite, F.L.S., 1904.

Catalogue of the Rhopalocera of Australia, by G. A. Waterhouse, D.Sc., B.E., F.E.S., 1903.

Plants Indigenous and Naturalised in the Neighbourhood of Sydney, by W. Woolls, Ph.D., F.L.S., 1891.

Australian Butterflies: A brief account of the native families with a chapter on the collection and preservation of insects. Illustrated with woodcuts. By A. S. Olliff, 1889.

The above publications may be obtained from the Hon. Secretary, price sixpence each. Postage twopence extra.

The Australian Naturalist

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AUSTRALIAN PINE TREES.

By Walter W. Froggatt, F.L.S.

The genus *Araucaria* was created by de Jussieu, in 1789, for a conifer which had first been described by Parvon, in 1782, under the name of *Pinus imbricata*, and which formed forests on the Patagonian Andes. The author to define the genus used the name, when he redescribed this tree, of the *Araucarian* Indians, who inhabited these forests, and collected the seeds for food.

The members of the genus *Araucaria* are now (with the exception of a single species in Brazil, known to English gardeners as the "Monkey Puzzle Tree," and the typical one in Chile), confined to the Pacific Islands and Australia.

In geological ages, however, the *Araucaria* pines had a much wider range. They formed forests in America from the Arctic regions down to Patagonia. Fossil species are recorded from South Africa and Madagascar, and there were great forests in Britain and Central Europe. Other fossil species have been discovered in Australia.

Lyell, in his "Elements of Geology," figures an *Araucaria* seed cone from the Oolitic beds of Somersetshire. Murchison, in his "Siluria," writing upon the plant remains in the British coal measures, says: "Some curious extinct pine trees, a few of which resemble the living *Araucaria* of Norfolk Island."

These fossil seed cones and stems are so often met with, that geologists have coined the word *"Araucarites"* to define them. These pine trees, which might be called "links with the past," are divided into two well-defined genera, *Agathis* and *Araucaria.*

The first genus contains the "Kauri pines." The New Zealand Kauri, *Agathis australis,* is one of the best known species on account of its durable timber. It is probably from the site of primeval forests of this or an allied species that the Kauri gum, which has been a source of income to the diggers in the Kauri gum fields of New Zealand for many years, is obtained.

The generic name *Agathis* is taken from a Greek word, meaning a ball of string, in allusion to the shape of the large rounded seed cones. It was created by Salisbury, in 1747, for the reception of the Amboina pine, discovered in the Moluccas.

The first of our Kauri pines recorded is now known as the Norfolk Island pine, *Araucaria excelsa.* It was first called *Araucaria columnaus,* because, when Captain Cook, in 1774, first sighted the great stems of these pines standing up against the skyline as he approached this unknown island, he thought that they were columns of basalt. From a very early date these pines have been cultivated in Australia, and from their graceful form are very popular in avenues, parks and gardens. There are some very old historic Norfolk Island pines in the Sydney Botanic Gardens, the best known of which is the "Wishing Tree," first planted in front of old Government House, in Phillip Street, but later removed from there and planted in its present site at the request of Mrs. Macquarie, in 1816.

The Hoop Pine, *Araucaria Cunninghami,* takes its popular name from the vertical structure of its bark, which when detached from the trunk by the timber cutters forms large circular bands or hoops. It has other local names, such as "Moreton Bay Pine," "Richmond River Pine," "Maryborough Pine," and "Colonial Pine."

It takes its specific name *Cunninghami* from the well-known explorer and botanist, Allan Cunningham, who first collected specimens in the Richmond River scrubs, in 1824, and sent them to Aiton to describe. This is the only species in New South Wales—its southern limit is the head of the Macleay River, extending northward along the Queensland coast across to the highlands of New Guinea. The last stand of the Hoop Pine in New South Wales is in the great Dorrigo forest, from which an immense amount of timber has been cut and sent to Sydney.

Though the timber men consider that the Hoop Pine is a very slow grower, Baron von Mueller says it will average from thirty to forty feet in height in twenty years. In

January the seeds from the great cones are scattered all over the floor of the forest, and with regeneration young forest could be easily established as the seedlings are very hardy. The writer examined many huge logs on the ramp at Brookland Sawmill, and from their annular rings these giants were over two hundred years old. The second species confined to Queensland is the "Bunya-Bunya Pine," *Araucaria bidwilli.* The Bunya Bunya Mountains, where they form a large forest, is a reserve for the natives, who depended upon the crop of seeds for food, just as the *Araucarian* Indians did in the mountains of South America. The specific name was given this species by Hooker, in 1850, in honour of I. C. Bidwill, who was first entitled Government Botanist and Director of the Botanic Gardens of Sydney, and discovered this species in the Wide Bay district, Queensland. Besides these local species there are two more in New Caledonia.

In Miss Petrie's book, "Tom Petrie's Reminiscences of Early Queensland" there is a very interesting account of the "Bonyi Season on the Blackall Ranges," when her father was present at one of these picnics. She states that the Bunya Bunya pines produce a large crop of seed cones every third year, when, in old times, the blacks gathered together from the surrounding districts to feast upon the seeds.

Captain Cook's Pine, *Araucaria Cooki* and *Araucaria Rulei* grow too large for street trees, but are admirably adapted for planting along ocean beaches. The charm of the ocean beach at Manly is its rows of Norfolk Island pines. Perhaps the two finest trees in the country are the pines in front of the residence at Kurnell standing out against the skyline.

The Sandy Sprat.—At the February meeting, Mr. D. G. Stead exhibited a number of specimens of the Sandy Sprat, *Hyperlophus vittatus*, Cast. These fish, he said, were a valuable commercial sprat, which occurred in our waters in prodigious numbers, but were not yet made use of. The specimens were taken from part of a shoal then lying in the lower waters of Port Jackson, near the Heads. At that time dense shoals were moving. The movement was stated to be in connection with the spawning of the fish, which then contained ripe eggs ready for extrusion.

THE DISCOVERY OF THE EGGS OF *HETEROJAPYX GALLARDI*, TILLYARD.

By Luke Gallard.

Ever since the adult of *Heterojapyx* was described a careful search has been maintained to discover the eggs, and, as the adults usually live some distance under the ground, this has not been an easy task.

On December 6, 1930, when digging deeply in the soil for other insects, at Epping, New South Wales, I came across a group of 25 eggs, which resembled those of a small centipede. These eggs were found in one end of a long and somewhat irregular tunnel in the soil, about nine inches below the surface.

In the other end of the tunnel there was a large female *Heterojapyx,* and the fact that it seemed to cling around the eggs, after they were unearthed, suggested to me that it had laid them.

The eggs were round in form, of a light amber colour, and stuck together by a slightly gelatinous substance. On reaching home, I commenced to detach a few for preservation, before putting them away to hatch, and whilst I was thus engaged the young larvae began to emerge, and one may imagine my joy, when I found they were the tiny larvae of *Heterojapyx.*

They were white and about one-fourth of an inch in length. In form they resembled the adult. The anal segments at this stage are not strongly chitinized.

A little later, in the same locality, I unearthed a fine example of the female, with a family of fifteen young, which clustered around the mother, *Heterojapyx,* like young centipedes, so that I was able to pick up ten in my hand with it. The remaining larvae clustered together until I collected them.

I was fortunate in unearthing a female centipede with a family of young, on the same day, and this enabled me to compare their habits with *Heterojapyx,* and in which they were almost identical.

A few notes were written by me on the young of this insect on April 6, 1920, under the heading of Mr. and Mrs. Japyx and family.

The adult form of *Heterojapyx gallardi* is figured by Dr. Tillyard in his book, "The Insects of Australia and New Zealand." The head and fore part of the body somewhat resemble a centipede, while the hind part is very much like that of the earwig, the last two segments being heavily chitinized, and terminating in a pair of powerful forceps with which it seizes its prey.

A NOTE ON WATER SNAILS.

By Arthur F. Norris.

Sometime ago I placed six water snails in my aquarium, along with some shrimps, and a "yabbie," about an inch and a half in length.

The "yabbie" pursued the shrimps, while the snails fed on the best of the water plants.

I then introduced twelve bronze carp, about four months old, which quickly adapted themselves to their changed conditions.

One morning I noticed there were only eleven, and several days later only seven, and search as I would no trace of the missing carp could I find.

At this stage, the crayfish ("yabbie") was removed as being the culprit, the shrimps having already disappeared. After two days the carp were reduced in number to three, so I sat to watch for the cause of this.

The snails would take up their positions in twos or threes. A carp would swim near them and remain motionless for some time, and then the snails' ugly heads would move cautiously towards it. Several times they succeeded in touching the body of the tiny fish. The next day, however, I was fortunate enough to see the last of the fish, firmly embedded between two of the snails which were devouring it.

During their life in the aquarium the fish were quite healthy and vivacious, so that the possibility of a snail catching a fish which was in a sickly condition may be eliminated. Also there was ample food for both fish and snails, so it is rather a curious incident. Several people I have questioned on the subject have stated that they have never heard of such an occurrence.

I may mention that Mr. M. E. Gray also noticed this happening in his aquarium at the same time.

[It would be of much interest to know what species of snail Mr. Norris had in his aquarium. Possibly they could be determined by Mr. T. Iredale, the Conchologist to the Australian Museum.—Editor.]

Fossil Fishes.—At the May meeting, Mr. D. G. Stead exhibited a number of fossil fishes from the Green River beds of Wyoming, U.S.A. He pointed out that they were of Eocene age and were of special interest to Australia, because of their close relationship to existing diplomystid herrings (the common Freshwater Herring or Freshwater Sprat) in eastern Australia.

IN COPETON VALLEY.

By R. J. Watson.

To the casual observer the little valley of Copeton would appear to be most uninteresting; yet this little village was, some thirty years ago, one of the busiest diamond and tin mining centres in north-west N.S.W.

Copeton is situated 14 miles south-west of Inverell, and in 1900 boasted many mining companies, the largest being the "Star of the South." Now it is almost a deserted village, but a wonderful collecting ground for the geologist.

During my short holiday I obtained many local specimens of minerals, viz.: zinc blende, smoky crystal quartz, galena, native silver, carbonate of blue, copper, molybdena, pencil tourmalines, sapphires, antimony, mica, reef tin, garnets, and alluvial tin.

The geologist will find much of interest in the old diamond races and mine workings—now deserted—to fill in quite a long holiday

A few prospectors still wash for diamonds and tin. Last year a tin mining company made another attempt to dredge for tin in the Copeton Creek, but owing to the enormous cost of production and the low price of tin it has been obliged to close down.

I was fortunate in making the acquaintance of Mr. F. Mount, who has a fine collection of jewels (which would delight the eye of any lady) and minerals, and who is ever ready and willing to show them and give advice to anyone interested.

Vegetation is rather poor, the trees being somewhat stunted; only two Eucalypts being noticed, cedars and wild apple, *Angophora intermedia*.

Wandering along the banks of the creek, I was delighted to find our old friends, the red Bottle Brush, *Callistemon* and *Bursaria spinosa*. Owing to the dryness of the season, these were the only native flowers I found.

The feathered population was varied, but not numerous, probably owing to the scarcity of food. Birds noticed were Kookaburras, Magpies, Blue Wrens, Willie Wagtails, Crows, one Kingfisher, and small Parrots.

As "Nae man can tether time nor tide," and I had to make my way home, I reluctantly turned my back on this little Geological Paradise, hoping some day to go back and hunt for more treasures.

WILD LIFE ON THE IRRIGATION AREA.

(Abstract of lecture delivered by Mr. Keith C. McKeown.)

The Murrumbidgee Irrigation Area lies on the south-western plains of N.S.W., about 400 miles by rail from Sydney. If one follows the course of the water to the Irrigation settlement, then on leaving the Murrumbidgee River one passes through the river frontage country before coming out on to the plains. The trees are mainly red gums, some of them giants, which have weathered many storms. Following on the floods of 1916, immense numbers of red gum seedlings developed, a growth such as had not previously been known in white man's time. These form almost impenetrable thickets for many miles along the river banks. Acres of these seedlings are annually stripped of their foliage by the black bristly larvae of the steel-blue sawfly, *Perga dorsalis*. Another common insect among the trees is the large green and black tree grasshopper, *Ephippitytha* 32-*guttata*, but they must be carefully looked for, as they bear a very close resemblance to the foliage of the trees.

"Goannas" or Monitor lizards are numerous in this type of country, and also range on to the plains where they destroy large numbers of young rabbits.

Before the coming of settlers the Red Kangaroo was plentiful, but is now only seen during droughts.

The Echidna or Spiny Ant-Eater is now rarely seen, although an occasional specimen still finds its way into the settled areas.

The white-winged Chough and the Apostle birds are typical of the plains, seeking their food (insects) among the stunted trees. The Stone Plover or Curlew, once so numerous, has almost succumbed to the combined forces of settlement, foxes and domestic cats gone wild. Another bird, almost vanished, is the Emu.

In the spring, the plague Locusts emerge from the egg beds and travel in vast swarms to attack the cultivated crops on the area. They are preyed upon by many insectivorous birds.

Each swarm of Locusts is accompanied by a cloud of these birds, and provides an impressive object lesson in the value of birds in the control of insect pests.

A striking insect of the plains is the White Caper Butterfly, which in the summer months frequently migrates in great numbers towards the east.

The Starling, which first appeared in 1916, rapidly increased, and is now present in millions. They are a serious pest of grapes. Hawks are perhaps the greatest enemies of the Starling, yet when a farmer sees a Hawk he usually runs for his gun.

The rice fields, with an area of about 20,000 acres, attract many birds, and Shags or Cormorants, Blue Cranes, Straw-necked and White Ibis destroy the "yabbies" which tunnel into the banks and cause loss of water. Mosquito control in the rice growing area presents a problem of particular difficulty, as oiling the water cannot be resorted to without injury to or destruction of the crop.—M. E. Gray.

OUR ABORIGINES.

(Abstract of lecture delivered by Mr. W. W. Thorpe.)

The lecturer stated that owing to isolation for many centuries Australia had a uniform series of aboriginal tribes. Australian characters are to be found in some of the present day races of India, and it is assumed that our aborigines are of Asiatic or Caucasian origin. Certain discoveries indicate that their arrival in Australia was at least 20,000 years ago. The aborigines were food gatherers, as distinct from food producers. They followed the seasons for game, fish and vegetable products. When camped on the foreshores they fed at well-known sites, and often immense masses of shells and other food refuse accumulated. These sites are called "kitchen middens."

Perhaps, one of their most striking customs was the "bora," or man making ceremony, which was general throughout the continent.

The Australian aborigines are world renowned as the inventors of the returning boomerang.

In conclusion, Mr. Thorpe called attention to the need of something definite and speedy being done for the people that are still with us. This could best be done by placing them where they are free, on a reservation, with a no man's land between, not to be impinged by whites or blacks.

Mr. Thorpe further stated that, while there are barely 1,000 full bloods in N.S.W., we cannot be blind to the fact that there are over 5,000 half-castes.

It is not flattering to our own powers of intelligence to find that we are allowing this supremely interesting race, one of the last representatives of the earliest stages of human culture, to perish without having made any serious national effort to prevent it.—M. E. Gray.

A DAY IN FRENCH'S FOREST.

By D. Lawry.

Weary of being cooped indoors by the continued wet weather, on Sunday, June 29, 1930, a friend and I braved the elements and went for a day's walk in French's Forest. We were luckier than we had expected to be, for the heavy rain ceased about mid-day, and in an hour or so the sun was shining gloriously from a blue sky.

Leaving the Spit, we walked about 4 miles along the French's Forest Road, and were much impressed by the joyous appearance of the *Casuarina* and shrubs which line this road. Although .usually smothered under a thick coat of red dust, they were then, thanks to the rain, washed clean, and, as well as being all bright and shining, many of the *Casuarinas* were flowering.

Just before leaving the road, we noticed a flock of about a dozen Black-faced Cuckoo-Shrikes, or "Summer Birds." Their presence near Sydney in midwinter draws attention to the extreme mildness of the weather this year.

As the rain ceased, we found a sheltered spot among some rocks, where we stopped for lunch, and were greatly surprised by a flock of some 8 or 10 Yellow-tailed Black Cockatoos. which appeared, screeching, from the direction of the road, and rested in the trees overhead before they flew on, so that we had a good view of them. I last saw Black Cockatoos in the wilds of the Kowmung Valley, and had no idea they came so close to civilisation as French's Forest.

After lunch, we made our way down the creek towards Bantry Bay. and saw many cascades, one fair-sized waterfall, and a perfect rock-bridge. We also found two unusual specimens of fungus—unusual to us, at least; one was small, bright orange, semitransparent, and growing on a dead stick; the other, a pale yellow,, of the "cauliflower" variety. growing in the soil.

Then my friend found a number of small brown terrestrial orchids, *Acianthus caudatus,* known as the "little spider orchids."

We next found an interesting comb fern, *Schizaea bifida.*

Later, when climbing up the hill, from tidal waters, or mangrove level, to the road, we noticed several clumps of uncommon "gums," *Eucalyptus virgata,* the leaves of which were huge. They were three inches or more across and from seven to nine inches in length, although the trees were only about fifteen feet high.

The outing was particularly pleasant, because so many wet week-ends had prevented our making earlier excursions into the bush.

THE ANCESTORS OF AUSTRALIAN MARSUPIALS.

(Abstract of lecture by Mr. A. S. Le Souef.)

Mr. Le Souef said that very little was known of our marsupials from fossils, as unfortunately Australia did not appear to possess any extensive fossil beds such as exist in parts of America and Europe.

Large reptilian forms once roamed this country in immense numbers, and the *Diprotodon* existed in Central Australia. The marsupial Rhinoceros was another prehistoric animal, but Platypus and Echidna fossils are always of the present day type.

The Koala is a highly specialised animal, differing in many ways from most arboreal animals, and is tail-less and very heavy. It has no near relations, and no fossil remains of its ancestors have ever been found.

The Bandicoots are another exclusive genus of which no fossil forms are known to exist, and they have no connecting links with other marsupial families.

The Wombat is another isolated type.

The giant Kangaroos were probably killed off for food by the early aborigines; of these, fossil evidence is fairly good. Isolated examples of giant size have been shot in recent years in wild country, little frequented by man. mainly in West Australia, and some six or seven examples so secured now form interesting exhibits in various museums in other parts of the world, but, alas, no such specimens have been retained here!

Evidence of a reliable nature indicates that the ancestors of the Tasmanian marsupial Tiger still exist in the swamps of Cape York and south of the Gulf of Carpentaria.

In conclusion, Mr. Le Souef impressed upon his audience the urgent necessity of forwarding all fossil bones to the Australian Museum for determination whenever any were discovered, as it was most important that no fossil record should ever be overlooked that might throw some light, however little, on the ancestors of Australian marsupials.—M. E. GRAY.

A NOTE ON *PINARA DESPECTA* WALKER.

By Luke Gallard.

The adult moth emerged on May 6, 1930, from a pupa given me by Miss McAnene. The caterpillars of this moth are rather soft, and on each side of the body, extending laterally, from the head to the tip of abdomen they bear a fringe of hairs, which, when they are extended on a twig, at rest, fit close to the surface, so that it is extremely difficult to detect them.

The caterpillar is dark grey and has a V-shaped mark across the thoracic segments. They measure up to two inches in length. Their main food plant seems to be the wattle, but occasionally I have taken them on the "white box."

The caterpillar pupates in a stout silken cocoon, which is usually spun between several leaves.

An outstanding character in the adult moth is the highly developed labial palps, which protrude so far in front of the head as to have the appearance of a snout. On this account the moth has sometimes been referred to as the long-nosed moth.

[I believe this species is identical with one, the caterpillars of which are commonly found feeding upon the foliage of the ornamental street trees, *Tristania conferta,* around Sydney.

Mr. W. W. Froggatt, in his "Forest Insects of Australia," states that the caterpillars of *Pinara despecta,* "feed upon the foliage of several species of Eucalypts."—Editor.]

AUSTRALIAN BUTTERFLIES.

(Abstract of lecture by Dr. G. A. Waterhouse.)

Among the many butterflies described and illustrated were the large "Wood-browns," "Blues," "Coppers," Leafwing Butterflies and the "Brown Wanderer."

In dealing with the Satyrids, Dr. Waterhouse mentioned that only one specimen of *Heteronympha solandri* had ever been bred out in captivity, the specimen illustrated having been bred out by him from an egg dissected from a female taken on Mount Kosciusko; the larva and pupa were carefully nursed for some nine months before the imago emerged.

Referring to the *Papilionidae,* the lecturer said that the Glass-winged Papilio was the first Papilio to be described from Australia, and the orchard Swallow-tail, *P. aegeus.* was a form that had variants, both in the north of Australia and in other countries, but strangely enough the Santa Cruz form was practically identical with the Sydney one.—M. E. Gray.

NATURALISTS' SOCIETY OF NEW SOUTH WALES.

Proceedings.

NOVEMBER, 1930.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, November 4, at 8 p.m.

The President (Mr. W. W. Froggatt, F.E.S., F.L.S.), in the chair, with 40 members and visitors present.

Lecture.—Mr. A. S. Le Souef, Director of Taronga Park Zoological Gardens, delivered a lecture, entitled, "The Ancestors of the Marsupials," illustrated with lantern slides. He was accorded a hearty vote of thanks.

Excursion.—Mr. J. Powell gave an interesting report upon the excursion to the aboriginal camp at Kurnell, made under the leadership of Mr. W. W. Thorpe, Ethnologist to the Australian Museum.

Treasurer's Statement.—The Hon. Treasurer's monthly statement showed a credit balance of £27/14/4.

Nomination of Member.—Mr. Rodney Whyte. Proposed by Mr. W. W. Froggatt. Seconded by Mr. R. A. Black.

Delegate of Society.—Mr. D. G. Stead, as delegate from this Society to the special meeting of the Parks and Playgrounds Movement, reported his attendance at that meeting, and said that delegates of the various sporting and town planning Associations had met and elected four representatives, who will confer in an honorary capacity with the Surveyor-General in his inquiry into the whole question of securing sufficient parks and playing fields. Mr. Stead's report was received and adopted.

Exhibition of Specimens.—Mr. G. G. Park, specimen of Pomegranate, *Punica granatum,* and aboriginal flaked choppers collected at Kurnell.

Mrs. L. A. Heyner.—Specimens of giant "everlastings" from West Australia.

Master Marks.—Specimen of the fruits of *Martynia proboscidea.*

Miss Black.—Specimen of *Hymenanthera dentata.*

Mr. White.—Specimens of minerals.

Professor Abbott.—A collection of "wild" flowers and specimen of *Martynia proboscidea.*

Mr. Booth.—Specimen of *Acanthus mollis.*

Mr. Froggatt referred to the invasion of the "stinking" beetle.

Mr. Stead reported upon the occurrence in the Harbour of the Humpback Whales caused by the presence of "Killers" in coastal waters.

DECEMBER, 1930.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, December 2, 1930, at 8 p.m.

The President (Mr. W. W. Froggatt, F.E.S., F.L.S.), in the chair, with 45 members and visitors present.

Lecture.—Mr. Keith McKeown, Assistant Entomologist to the Australian Museum, delivered a most interesting lecture on "Wild Life in the Riverina," illustrated with a fine series of lantern slides. The lecturer was accorded a hearty vote of thanks.

Excursion.—Mr. M. E. Gray reported upon the excursion made to Maroubra Bay on Saturday, November 29.

Correspondence.—Miss Elsie M. Bennie, of Kew, Victoria, wrote asking for particulars of a camping holiday in the Northern Rivers district.

The Hon. Secretary said that Senator Daly publicly stated that "fish was one of the richest fields in Australia," so he wrote and forwarded a copy of Mr. Stead's Presidential Address on "Sardines, Pilchards, Herrings and Anchovies." (Aust. Nat., VIII., pt. 4, October, 1930.)

The Senator acknowledged receipt and thanked him for the article.

New Member.—Mr. Rodney Whyte was unanimously elected a member of the Society.

Nomination of Members.—Miss B. Coxhead, "Whare-Kura," Warrida Street, Kirribilli. Proposed by Mr. J. Powell, seconded by Mr. R. A. Black. Master Hilton Gray, 161 Addison Road, Marrickville. Proposed by Mr. M. E. Gray, seconded by Mr. R. A. Black.

Exhibition of Specimens.—Mr. G. G. Park—specimens of *Eugenia myrtifolia*, *Lagunania patersoni*, and *Euonymus japonica* var. *variegata*.

Mrs. M. Jenkins.—Specimen of Australian Chestnut, *Castanospermum australe,* showing inflorescence and pod. Specimens of minerals obtained in England and South Africa.

Master John Ludowici.—Boomerang made from the Mulga tree.

Mr. Harrison.—Specimen of Kauri pine, showing foliage and cone, grown at Waverley.

Mrs. S. A. Howell.—Specimen of blossom of *Eucalyptus virgata.*

Mr. W. W. Froggatt.—Specimen of the "two-headed" Hawk Moth Caterpillar, *Coequosia triangularis.*

FEBRUARY, 1931.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, February 3, 1931, at 8 p.m.

The President (Mr. W. W. Froggatt, F.E.S., F.L.S.), in the chair, with 55 members and visitors present.

Correspondence.—The Under-Secretary, Department of Land, wrote saying that the Minister could not accede to the inclusion of an additional area in the proposed National Recreation Reserve at Point Lookout.

Letter from Mr. Phillip A. Wright, of Wallamumbi, thanking the Hon. Secretary for particulars of the Minister's decision.

Treasurer's Statement.—Mr. John Powell submitted his statement, which showed a credit balance of £9/16/9.

New Members.—Miss B. Coxhead and Master Hilton Gray were unanimously elected members of the Society.

Nomination of Members.—Miss E. Wright, c/o Mrs. Lewis, "Gissingham," Gallipoli Street, Bankstown. Miss L. Shermer, 110A Bathurst Street, Sydney. Miss E. Jeffreys, 64 The Drive, Concord West. Proposed by Professor A. J. Abbott, seconded by Mr. R. A. Black. Mr. Thomas Dodd, 11 Brereton Avenue, Marrickville. Proposed by Mr. M. E. Gray, seconded by Mr. R. A. Black. Miss L. V. Kenneth, c/o E. S. & A. Bank, Ltd., George and King Streets, Sydney. Proposed by Mr. W. W. Froggatt, seconded by Mr. R. A. Black. Miss D. Anderson, 103 Ridge Street, North Sydney. Proposed by Mrs. F. J. Ludowici, seconded by Mr. R. A. Black. Miss M. White, "Baringa," Dudley Street, Hurstville. Proposed by Mr. R. A. Black, seconded by Mr. W. W. Froggatt. Miss O. Phillips, "Windsor," Fern Street, Hunter's Hill. Proposed by Mr. W. W. Froggatt, seconded by Mr. R. A. Black.

The President referred to the disastrous earthquake which had overtaken the people of Hawkes Bay district, New Zealand. A motion, proposed by Mr. D. G. Stead, seconded by Professor A. J. Abbott, was carried by members standing, that the Honorary Secretary convey to the Prime Minister of the Dominion of New Zealand, members' heartfelt sympathy in the great catastrophe which has befallen the people of Hawkes Bay district.

The Honorary Secretary referred to the honour of Fellowship of the Royal Zoological Society of New South Wales, bestowed upon the President, Mr. W. W. Froggatt.

This information was received with acclamation.

Exhibition of Specimens.—Mr. J. Powell, specimens of oil, and fossilised shells, from oil-bearing country in Victoria, near Lakes entrance.

Professor A. J. Abbott.—A large collection of native flowers and articles manufactured from native timber.

Mrs. S. A. Howell.—Blue Wren's nest, made of human hair, and larva of "Wanderer Butterfly," *Danaida.*

Miss L. Steinbeck.—Specimens of *Isotoma axillaris* and *Calostemma luteum,* grown in a garden at Mangrove Mountain. A cone of *Banksia serrata* and specimen of the "two-headed" Hawk-moth Caterpillar, *Coequosia triangularis.*

Mr. D. G. Stead.—Specimens of the Sandy Sprat, *Hyperlophus vittatus,* desert plant, *Ptilotus exaltatum* and a pink-flowering plant known as Parra-keel-ya.

Mr. Luke Gallard.—Notes on the discovery and hatching of the eggs of *Heterojapyx gallardi,* and female Centipede with young; also specimens of *Heterojapyx gallardi.*

Miss Garling.—Specimen of nest of "Mud-dauber Wasp. Pupa of "Blue-Fanny" Butterfly.

Mr. A. E. Watson.—Specimen of fruit of native passion vine, *Passiflora herbertiana.* Specimen of variegated "Buffalo" grass. Growing specimen of *Melaleuca hypericifolia.*

Mrs. M. Jenkins.—Fruits of the "Evergreen" Whitethorn, *Crataegus pyracantha,* and Lilli-pilli, *Eugenia smithii.*

Mr. W. W. Froggatt.—Specimens of Coccid galls and twig ringbarked by a longicorn beetle, *Symphyletes neglectus.*

MARCH, 1931.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, March 3, 1931, at 8 p.m.

The President (Mr. W. W. Froggatt, F.E.S., F.L.S.), in the chair, with 60 members and visitors present.

Members' Evening.—The members exhibited a fine collection of lantern slides and exhibits. Notes on various subjects of general interest were read. Among those taking part were Messrs. Albert Royce, A. E. Watson, L. Gallard, M. E. Gray, David G. Stead, W. W. Froggatt, R. J. Watson, A. F. Norris, R. A. Black, Professor A. J. Abbott, Master Kelvin Stead, Mrs. L. A. Heyner, and Miss D. Lawry.

Correspondence.—Messrs. N. H. Seward, Pty., Ltd., Melbourne, wrote requesting that their advertisement on the cover of the Journal be cancelled.

Mr. Noel Burnet, of Koala Park, wrote explaining how the journey may be made to the Park. It was agreed to make an excursion there in August or September next.

The Prime Minister of New Zealand thanked the Society for the message of sympathy in reference to the earthquake disaster in the Hawkes Bay district.

Treasurer's Statement.—Mr. John Powell submitted his statement, which showed a credit balance of £11/0/9.

New Members.—Miss E. Wright, Miss L. Shermer, Miss E. Jeffreys, Mr. Thomas Dodd, Miss L. V. Kenneth, Miss D. Anderson, Miss M. White, and Miss O. Phillips.

Nomination of Members.—Master Kelvin Stead, Pacific Street, Watson's Bay. Proposed by Mr. D. G. Stead, seconded by Mr. R. A. Black. Master Richard Ankers, 87 Helen Street, Lane Cove. Proposed by Mrs. S. A. Howell, seconded by Mr. D. G. Stead. Mr. A. E. Tebbutt, "Pendanis," Haberfield. Proposed by Mr. G. G. Park, seconded by Mrs. Park. Miss L. Amphlett, 50 McLaren Street, North Sydney. Proposed by Miss D. Anderson, seconded by R. A. Black.

Resignation.—Mr. Geo. Scammell forwarded his resignation, which was accepted with regret.

APRIL, 1931.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, April 7, 1931, at 7.45 p.m.

The President (Mr. W. W. Froggatt, F.E.S., F.L.S.), in the chair, with 30 members and visitors present.

Lecture.—Mr. T. Hodge-Smith, Mineralogist to the Australian Museum, delivered a very instructive and interesting lecture, illustrated by a large series of lantern slides, showing the various geological formations to be met with in Central Australia. On the motion of Mr. A. E. Watson, seconded by Mr. F. J. Ludowici, a hearty vote of thanks was carried by acclamation.

Correspondence.—The Microscopical Society of New South Wales wrote asking the Society to join in a united protest to the Under-Secretary re the leasing of portion of Centennial Park to an Exhibition Syndicate. Agreed to.

The Australian League of Nations wrote re insertion of a list of the League's publications in the "Australian Naturalist."

Nature Exhibition.—The President stated that owing to expense the Nature Exhibition would not be gone on with.

Treasurer's Statement.—Mr. John Powell submitted his statement, which showed a credit balance of £21/11/3.

New Members.—Master S. K. Stead, Master Richard Ankers, Mr. A. E. Tebbutt, Miss L. Amphlett, were unanimously elected members of the Society.

Exhibition of Specimens.—Master John Ludowici—specimens of aboriginal stone implements and a yabbie.

Mr. A. E. Watson.—Growing specimens of *Chorizema cordata*, *Melaleuca hypericifolia* and leaf of "fibre plant."

Mrs. S. A. Howell.—Specimens of spiders.

Miss H. McAnene.—Specimens of Honey Flower

Miss M. Garling.—A phial of melasol oil extracted from the leaves of *Melaleuca alternifolia.*

MAY, 1931.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, May 5, 1931, at 7.45 p.m.

The President (Mr. W. W. Froggatt, F.E.S., F.L.S.), in the chair, with 50 members and visitors present.

Lecture.—Dr. A. B. Walkom, Secretary of the Linnean Society of N.S.W., delivered a very fine lecture, illustrated with lantern slides, and entitled, "The Fossil Plants of Australia." On the motion of Mr. Stead, seconded by Mr. Powell, a hearty vote of thanks, carried by acclamation, was accorded the lecturer.

Excursion.—Mr. R. A. Black briefly described the excursion made to North Head, via the Quarantine Station, under the leadership of Mr. T. Hodge-Smith.

Correspondence.—Miss K. Parkes, asking for particulars of membership.

Dr. G. A. Waterhouse, notifying change of address to 305 Science House, Gloucester and Essex Streets.

Dr. A. J. Metcalfe, enclosing permit for members to visit Quarantine Station.

Treasurer's Statement.—Mr. John Powell submitted his statement, which showed a credit balance of £20/10/7.

Nomination of Members.—Miss R. J. Lindeman, 76 Spit Road, Mosman. Proposed by Miss Amphlett, seconded by Mr. R. A. Black. Miss F. Butler, 397 Glebe Point Road, Glebe. Miss K. Parkes, "Ivanhoe," Ryde Road, Hunter's Hill. Proposed by Mr. R. A. Black, seconded by Mr. W. W. Froggatt.

Exhibits.—Mr. D. G. Stead exhibited a number of fossil fishes from the Green River beds of Wyoming, U.S.A., and also a number of Ammonites (fossil *Cephalopoda*) from Whitby, England.

Mr. Luke Gallard.—Larva of moth attacking quinces.

Master John Ludowici.—Fishhook and bait from the South Sea Islands, and specimen of rock showing dendritic markings.

Mr. A. Booth.—Seeds and pod of the Moreton Bay chestnut or black bean, *Castanospermum australe.* Specimen of *Psilotum triquetrum,* one of the *Lycopodiaceae* showing the globular capsule-like sori.

JUNE, 1931.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, June 2, 1931, at 7.45 p.m.

The President (Mr. W. W. Froggatt, F.E.S., F.L.S.), in the chair, with 45 members and visitors present.

Lecture.—Mr. A. R. Penfold, F.A.C.I., Curator and Economic Chemist to the Technological Museum, delivered a very interesting and informative lecture on "Australian Essential Oils," illustrated with lantern slides and specimens. On the motion of Mr. J. Powell, seconded by Archdeacon Haviland and supported by several other members, a hearty vote of thanks was accorded Mr. Penfold.

Correspondence.—Letter from Zoological Museum, of the University of Berlin, asking for complete set of the "Australian Naturalist."

Letter from Mr. G. G. Park, reporting progress made by the President and himself in the classification of the library books.

Letter from Mr. A. H. Chisholm stating he would be pleased to lead an ornithological excursion in July or August next.

Treasurer's Statement.—Mr. John Powell submitted his statement, which showed a credit balance of £22/2/9.

New Members.—Miss R. J. Lindeman, Miss F. Butler and Miss K. Parkes were unanimously elected members of the Society.

Nomination of Members.—Miss Marie Petersen, Australian Club, Macquarie Street. Proposed by Miss Shermer, seconded by Mr. R. A. Black. Miss B. Rosebery Tebbutt, "Pendanis," Haberfield. Proposed by Mr. A. E. Tebbutt, seconded by Mr. R. A. Black.

Exhibition of Specimens.—Mr. M. E. Gray.—Specimen of "Cheese cutter," *Planarian.*

Mrs. S. A. Howell.—Specimen of green tree snake and *Brachyscelid* gall.

Mr. Luke Gallard.—Plant gall parasitized by wasps.

Miss D. Lawry.—A Gordian worm from Cowmung, New South Wales.

Tree Planting.—The Hon. Secretary tabled a copy of "Tree Planting in the Farm," by R. H. Anderson (Farmers' Bulletin, No. 167), and stated that copies could be obtained from the Department of Agriculture, New South Wales. Price, 1/-.

JULY, 1931.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, July 7, 1931, at 7.45 p.m.

The President (Mr. W. W. Froggatt, F.E.S., F.L.S.), in the chair, with 40 members and visitors present.

Lecture.—Mr. D. J. Mares, Divisional Meteorologist, delivered an address on "The Development of Meteorological Science and its Utility to Mankind."

This interesting and instructive address was illustrated by a long series of lantern slides, depicting various instruments used in research and for recording and prognosticating the weather.

On the motion of Mr. P. E. B. Barnett, seconded by Mr. D. G. Stead, a hearty vote of thanks was carried by acclamation.

Excursion.—The Hon. Secretary reported that some 60 members and friends had journeyed to Engadine on Saturday afternoon (June 4) and enjoyed a very pleasant couple of hours, under the leadership of Mr. A. H. Chisholm (assisted by Mr. Hindwood), who pointed out and described the birds of the locality. Mr. Chisholm also gave an interesting lecturette on Australia's bird mimics, particularly emphasising the accomplishments of the Lyre bird, the little brown Heath-wren, and the spotted Bowerbird.

Correspondence.—The President read a letter from the Town Clerk, North Sydney, inviting the Naturalists' Society to assist in the inauguration of the beautification scheme at Balls Head Reserve on July 25.

Treasurer's Statement.—Mr. John Powell submitted his statement, which showed a credit balance of £21/19/4.

New Members.—Miss Marie Petersen and Miss B. Rosebery Tebbutt were unanimously elected members of the Society.

Nomination of Members.—Mrs. M. Spong, "Kurraba," Tintern Road, Ashfield. Sister M. Joseph, St. Joseph's

Convent, Wombat, N.S.W. James Carr, Rock Forest School, Bathurst. Miss J. Reid, 36 Holdsworth Street, Newtown. H. H. Reece, Public School, Payten's Bridge, Eugowra. Miss N. McKellow, 70 Caledonian Street, Bexley. Mr. W. C. M. Elliott, Public School, Billimari. Master Jan Davidson, Public School, Billimari. Miss A. A. Frost, Public School, Nangus Creek, Nangus. Mr. P. R. Maguire, c/o Biological Branch, Department of Agriculture, Sydney. Miss Hilda Bocklen, 9 Wharf Road, Balmain, Snails Bay. Mr. C. W. Corner, MacGregor Street, Croydon. Miss Jeffreys, Public School, Annangrove, via Rouse Hill, N.S.W.

Excursion.—Moved by Mrs. Watson, seconded by Mrs. Howell, that the Society hold its next monthly meeting at Balls Head on Saturday, July 25, and that members participate in the beautification scheme of the reserve, and assist in the ceremony by planting a tree.

Vote of Thanks.—A vote of thanks, moved by Mr. Stead, seconded by the President, and carried by acclamation, was accorded to the Hon. Lanternists, Messrs. G. White and A. Booth; the Hon. Editor, Mr. E. H. Zeck, and the Hon. Librarian, Mr. G. G. Park, for their untiring services to the Society during the past twelve months.

Auditors.—Moved by Mr. Powell, seconded by the Hon. Secretary, that subject to their approval, Messrs. S. D. McPhee and E. L. Hayes be again appointed Auditors for the year ending July 31.

Annual Meeting.—The President reminded members that the next meeting would be the annual one, and suggested that special invitations be sent out to past members and members of long standing, inviting them to attend and take part in the proceedings of the meeting, or to send a greeting. This was agreed to.

Ladies' Committee.—The following ladies were appointed to assist the President and the Secretary in the preparation of the hall, and the arrangement of the exhibits: Mrs. Watson, Mrs. S. Howell, Miss L. Steinbeck, Miss H. McAnene, Mrs. W. W. Froggatt, Mrs. F. J. Ludowici, and Miss Anderson.

Exhibition of Specimens.—Mrs. S. A. Howell—specimen of acacia, showing fasciation of the stem; also an abnormal growth found inside a hen's egg.

Miss Anderson.—Dragon fly larvae found in an aquarium, where they were devouring young goldfish.

Mr. Luke Gallard.—Specimens of mealy bugs, yellow ants, and predaceous flies.

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NATURAL—AND UNNATURAL—HISTORY.

By H. J. Carter, B.A., F.E.S.

The relation between Natural and Unnatural History is analogous to that between Astronomy and Astrology, or between Chemistry and Alchemy. The former of each resulting from the slow, but sure growth of knowledge, broad-based on experience, and generally verifiable by experiment. The latter of each is also based on—or rather traceable to—experience, but warped or expanded under the stress of emotion, imagination and credulity, into an enormous body of literature and tradition, not verifiable by experiment. It may be divided into many branches. Videlicet:—

(a) Strange tales handed down the ages from prehistoric times, abounding in the early literature of our race, dealing largely with magic and monsters—as witchcraft, the evil eye, werewolves, dragons and demons—the roc and the Phoenix.
(b) Mistaken beliefs about animals that are common around us and their habits, such as the swallowing of their young by snakes to save them from danger, the firm belief amongst many bushmen that kangaroos are born attached to the nipple within the pouch, and the like.
(c) Fish stories with no necessary intent to deceive, and which may be included under "harmless hyperbole."

Man, in his earliest stage, was probably vegetarian and arboreal. The latter for strategic reasons, showing sufficient brain power to appreciate the maxim "Safety [illegible]" from the great carnivores and the sabretoothed tiger. In this stage he was the hunted, and he could move his ears as deer and donkeys do now. Some of us can still do this, more or less, while quite a lot of us eat nuts.

Indeed, the vegetarians claim a high position for this form of nourishment. Heavy nuts, possibly the ancestors of the cocoanut and the fir cones, were also man's first weapons. They are still used as missiles by the anthropoid apes.

Primitive man had also the wide nostril that indicated the full employment of a sense, now subobsolete in civilised races, but still existing to a marked degree in the African and Australian aborigines.

Man fell from both tree and nut life when he entered the second stage as the hunter.

Here he gradually learnt to use stones—first as missiles; secondly, as cutting and piercing weapons. This stage has left a lasting imprint on the race. Who of us has not nourished early aspirations towards providing bird, beast, fish, or even insect, as the captive of his bow, spear or net. Now, the veriest tyro in hunting knows that some knowledge of natural history is necessary to success; while the expert, whether of the stone age or the modern fly fisherman or big game hunter has to know a lot. Habits, haunts, food of his prey, conditions of wind and weather, associated trees and vegetation, and the like must be studied. Hence, with the hunting instinct, springs a lively interest in natural history; while the almost universal love of fishing at once leads to my double-headed title, since the art of Isaac Walton, perhaps, more than any other, has produced a literature in both branches. "The Compleat Angler," representing the Natural, while the lively imaginations of its votaries leads to that branch of Unnatural History that I have termed "Harmless Hyperbole."

Here and there crops up an individual who, not content with that "little learning" so fraught with danger, as saith the philosopher [He didn't say whether this was to soul or body], but who, like the unfortunate inquirer of the "Circumlocution Office," "wants to know, you know."

With such, the first steps to knowledge are those which cost time and trouble. A growing persistence and enthusiasm lead to an interest that ends only with life itself. In a curiously circumscribed literary age—sometimes known as the Classical—an English poet wrote, "The proper study of mankind is Man." Five years before Pope's birthday died Isaac Walton—a prince amongst natural philosophers. Gilbert White was a contemporary of Pope.

It would be interesting from the records of public libraries to compare the number of readers of "The Essay on Man" (outside the ranks of the unwilling school boy or girl) with those of "The Compleat Angler" and of "The Natural History of Selborne." Yet writers of Natural History were little known when the poet of Unnatural History had wide European fame. Only in recent years has the study of Nature come into its own as a subject of general interest.

Magic takes a large place in the life of primitive folk. Many attempts have been made to trace religious belief in the Australian aborigines, but so far little beyond demonology—the dread of evil spirits—or the malevolence of enemies aided by them, has been discovered. The influence of white men over such is often due to his possession of bigger magic than they can themselves produce.

A member of the Cambridge Anthropological Expedition to north-west Australia in 1913 told me that the difficulty in establishing friendly relations with certain tribes was quite overcome when one of them was induced to approach near enough to see a case of glass eyes used in getting accurate information as to the colour of the eyes of individual natives. This so filled them with awe that no further trouble was experienced.

Certain Esquimaux of North Alaska, in making fur clothing, especially for women, attach the tails of foxes to the outside; not as ornaments, but to prevent the lurking demon from capturing them in dark places, the tails coming off in the demon's clutch, instead of the cloak, just as lizards part with their tails as a means of escape. It is a humiliating fact that supposed civilised people retain much of this belief in magic, as is shown in the prevalence of charlatans, who make handsome incomes from the credulity of a large section of our community. As to traditional monsters, it seems probable that the widely spread conception of the dragon—prominent, for example, in Chinese heraldry—is due to some traditional terror, well founded on real dangers, endured by the earliest man. While available evidence places the Pterodactyl, Plesiosaurus and Co. in an older geological horizon than man, we must bear in mind that Nature takes a long, long time with her evolutionary work. The present-day crocodiles make it conceivable that sufficiently formidable descendants of these fearsome beasts were contemporaneous with anthropoids with enough intelligence to convey their impressions of extreme horror to their offspring, and that for a certain period, at least, dragon-like beasts preyed on our earliest ancestors. There is no smoke without fire.

Strong beliefs, however unreasonable to modern ideas, probably originated in concrete fact.

It is otherwise difficult to account for the many early drawings of the dragon, so closely resembling the *Pterodactyl,* fossil specimens of which had a spread of 18 feet across the wings. Other drawings suggest the *Diplodocus,* with its long neck, of which the specimen in the Carnegie Museum, Pittsburg, is 80 feet long, its back 14 feet from the ground, and having a body bigger than an elephant.

For curious mixtures of fact and fancy, readers may be referred to Pliny, whose translation into English by John Bostock, F..S., in 1855, is a classic. Here are a few excerpts. "Aethiopia produces dragons, not so large as those of India, but still 20 cubits in length."

"On those coasts four or five of them are found twisted and interlaced together like so many osiers in a hurdle, and thus setting sail with their heads erect, they are borne along upon the waves to find better nourishment in Arabia."

"The horse is born with a poisonous substance in its forehead known as *hippomanes* and used in love philtres; it is the size of a fig."

Here is news of the Phoenix: "The size of an eagle and has a brilliant golden plumage around the neck, while the rest of the body is of a purple colour, except the tail, which is azure, with long feathers intermingled of a roseate hue; the throat is adorned with a crest and the head with a tuft of feathers. It lives 540 years; that when it becomes old it builds a nest of cassia and sprigs of incense which it fills with perfumes, and then lays its body down upon them to die; that from its bones and marrow there springs at first a sort of small worm which in time changes into a little bird; that the first thing that it does is to perform the obsequies of its predecessor, and to carry the nest entire to the city of sun, near Panchaia, and there deposit it upon the altar of that deity."

"*Scorpions.*—The sting is invariably fatal to virgins, and nearly always so to matrons. It is so to men also in the morning, when the animal has issued from its hole in a fasting state and has not yet happened to discharge its poison."

"Garlic mixed with sulphur and resin draws out the humours from fistulous sores, and employed with pitch it will extract an arrow even from the wound."

"What we are going to say is marvellous, but it may easily be tested by experiment. If a person repents of a blow given to another, either by hand or with a missile, he has nothing to do but to spit at once into the palm of the hand which has inflicted the blow and all feelings of resentment will be instantly alleviated in the person struck."

"The human bite is also looked upon as one of the most dangerous of all. The proper remedy for it is human ear wax."

"A human tooth reduced to powder is a cure, they say, for the sting of a serpent."

Under my heading: "(b) Mistaken beliefs about animal life," there are in general only two reliable sources of information. The first is the pure aboriginal, uncontaminated by close contact with civilisation—a contact so often leading to a physical degeneration and loss of his peculiar bush lore. The second is the trained naturalist, who takes nothing for granted and proves, by close observation, the phenomena he describes.

It was by following up information received from natives that Sir Harry Johnston made the greatest animal discovery of recent years—*Okapi Johnstoni.*

It was through aboriginal information that Lumholtz discovered the tree kangaroo named after him, as also new species of so-called "possums." This lore, that is their very means of existence, is in striking contrast to the vague and often misleading information that one meets with so often from the average white bushmen, even when such men have been born and bred amongst country surroundings.

In North Queensland I was amusing myself with a beautiful little Gecko lizard, found under loose bark, when a timber-getter who saw this cried out in horror, "Drop it! That's a wood adder." Even after I had put my finger in its mouth and showed the innocuous teeth, I could not wholly remove my bush friend's fears, though I couldn't help thinking what a good example this was of giving a dog a bad name before hanging him. The common story that snakes swallow their young by way of protection from an enemy is, says Mr. H. A. Longman, an eminent authority on our snakes, "in general the result of a vivid imagination or of faulty observation," but certain rare cases would seem to have been established, says this author, and in captivity snakes have been known to swallow their young, but without disgorging them, while certain species are known to be cannibalistic (1). Thus the so-called protection would be somewhat of the nature of the Elephant of Fable, who tried to mother some orphan chickens by sitting on them.

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(1) Australian Encyclopaedia, ii., 471.

As to the myth concerning the birth of the infant kangaroo attached to the teat, it is often dangerous to dispute this, so heated becomes this advocatus diaboli, that one has either to bow to the storm—as Galileo did to the Inquisition—or literally fight for the truth against brawny odds. The bald but extraordinary fact of the helpless three-inch foetus crawling its blind way through fur to the refuge of the maternal pouch—with or without parental aid—is now definitely established by observation in more than one case. Perhaps the clearest evidence is that given by the late Professor Lancelot Harrison, in the "Sydney Morning Herald," as observed in the Sydney Zoological Gardens (2).

Tables concerning insects are especially prevalent. The popular name "horsestinger," as applied to dragonflies, is as ill-deserved as is the Greek *"Buprestis"* (bull-stinger), as applied to harmless vegetarian beetles; or as the name Locust for the many species of Cicada, so dear to the schoolboy. In fact, a large number of popular names in the Australian fauna are wholly misleading. The echidna is not a porcupine; the so-called opossum is not even closely related to the American rightful claimant of the title. The "goanna" is not an iguana; the Australian tarantula belongs to another family of spiders to that of the true tarantula of Southern Europe, and is a harmless beast, though fiercely crushed by the well-intentioned, but misguided bushman.

But it is not only the layman who thus errs. Even the man of science—especially of the kind known as a "cabinet naturalist"—gets badly "had" at times. One could scarcely devise a worse misnomer for our bright green tree frog than *Hyla coerulea,* a name due to the fact that the unfortunate specimens first described had, under the influence of alcohol in the pickle jar, turned blue.

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(2) Reference date given by "S.M.H." index.

A VISIT TO ULOOLA FALLS AND CASCADES.

By M. E. Gray.

Uloola * Creek, with its charming cascades and falls, is situated in the south-western section of National Park, about three and one-quarter miles from Heathcote Railway Station.

The track down to the "Pool," at Kangaroo Creek, begins close by Heathcote Hall, and soon passes into a rugged valley through Heathcote Glen, across Heathcote Brook, and along the opposite side of the valley, where it becomes a typical mountain pass, in miniature, then, without reaching the top of the ridge, it steeply declines once more to the bottom of the valley, where Heathcote Brook and Kangaroo Creek converge at the "Pool," one and a quarter miles from Heathcote.

From the "Pool" one follows a "spot" track that for the most part continues along the ridge top, and with the exception of one or two rough passages is fairly easy going. About three-quarters of a mile from the "Pool" the track reaches an elevation of about 600 feet, where, from a stony plateau, may be obtained a magnificent view of the rugged park lands, Port Hacking, Botany Bay, and Sydney, with the Harbour Bridge clearly outlined against the sky.

Near by, if one seeks beneath the right rocks, may be found the peculiar "Barking Gecko," which, if tormented, will not only rise up and "bark" (the "bark" is not very loud), but will leap six or eight inches off the ground to attack its tormentor. Fortunately, the Gecko's bite is just as harmless as its "bark."

Continuing, the track passes through several natural gardens of native flowers, the blossoms of which, during the late winter and spring, blend into one glorious harmony of colour.

Approaching Uloola, the song of falling waters gradually swells until we arrive at our destination, right on the edge of the cliff, where the creek falls some 60 or 70 feet, striking two ledges on its way, then it passes on more peacefully to where it joins Kangaroo Creek, some distance down the valley. A few hundred yards up-stream are the cascades, near which waratahs formerly grew to perfection, but during the last two years many raids have been made

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*Uloola.—The name taken from Kendall's poem, "The Last of His Race." "Uloola! Behold him," etc., is, I believe, an aboriginal word meaning God.

by vandals, and now the glorious stately blooms are few and far between. There is a smaller fall a few hundred yards higher up than the cascades, and there are numbers of rock carvings in the locality which I have not yet located.

When first discovered, a few years ago, the main fall, in normal times, I have been informed, was over the right-hand side of the cliff; now it is through a tunnel in the cliff face, apparently at a slightly higher level. This puzzled a number of us for quite a while, but we have come to the conclusion that, after passing over the cascades, and probably in the pool. the water now percolates through the soft sandstone until it reaches a hard strata, which later forms a tunnel, terminating as a hole in the cliff face, only just a few feet from the top and slightly to the left of what was, and still is, during floods the main stream. To see the cascades and falls at their best they must be visited in the winter months, or during and up to three days after heavy soaking rains. In the dry, hot, summer months, the stream becomes greatly diminished in volume, and a walk over the ridge is ill-rewarded on arrival at Uloola Creek.

NOTES ON THE DEVELOPMENT OF *CHELEPTERYX FELDERI*, TURNER (*ANTHELIDAE*).

By Luke Gallard.

During 1928-29 I kept a number of the larvae of *Chelepteryx felderi* in a glass-topped box, where they fed freely on clover leaves until November 1. After this period they fed on eucalyptus leaves until February 22, and would not eat the clover again, although occasionally they fed on grass. (I exhibited one of these specimens at our February meeting).

Two caterpillars lived until February 22, but during the next two weeks they gradually shrivelled up and died.

Four moults were noted up to November, but they may have moulted more frequently and eaten the cast skins before they were noticed by me.

During 1929-30 another series of larvae was reared, in collaboration with Mrs. S. A. Howell. My specimens fed chiefly on eucalyptus leaves, but the specimens developed by Mrs. Howell were fed almost exclusively on clover leaves, until the middle of the year, after which they commenced to feed upon eucalyptus leaves.

The following observations have been compiled from notes made by Mrs. S. A. Howell during the development of *Chelepteryx felderi.*

1928.

April.—Adult female moth captured.
April 26-30.—Eggs deposited.
July 5-9.—Eggs hatched.
July 12.—Larvae almost black; very hairy.
July 24.—Larvae reddish-brown, with a few white markings on third segment. The three thoracic segments and two anal ones clothed with long bristles, about twice as long as other hair.
July 30.—Larvae dark brown.
August 11.—Larvae paler brown.
August 23.—Larvae very sluggish; dark brown, and have lost much of their hair.
September 1.—Larvae pale brown; hair very long.
September 16.—Larvae pale brown; fleshy tubercles, very prominent and marked with white.
October 13.—Bristles very stiff; if these comes into contact with one's skin they may penetrate and break off, causing considerable pain.
December 13.—One larva pupated.
December 15.—Six larvae pupated.

1929.

April 28.—One female moth emerged.
May 4.—One female and one male moth emerged.
May 4-8.—Eggs deposited.
July 13-28.—Eggs hatched. The larvae developed, as in 1928, until December, when a sudden change in the temperature occurred and a number of the larvae died. In January, others died, leaving only three. They did not moult as frequently as those of the previous year.

1930.

January 25.—One larva pupated.
February 15.—One larva pupated.
May 28.—One female moth emerged.
June 14.—One female moth emerged.

THE HUMAN ELEMENT IN WILD LIFE.

By Arthur F. Norris.

It is surprising how often one finds traces of human nature in the many creatures with which our bush abounds.

The following incidents took place at Kookaburra Flat, on the Port Hacking River above Audley, just before sunset, and are examples of courage and fear, indifference and contempt, subtle wit and impotent rage, displayed to good effect by some of our common bush birds.

Apparently, this flat stretch of ground on the bank of the river is the hunting place of a pair of Wagtails (*Rhipidura*), and the manner in which they repelled intruders shows the almost human traits in their characters.

The Wagtails were busy feeding near the bank, when two large Kookaburras (*Dacelo gigas*) alighted noiselessly on a nearby tree.

For a while the Wagtails did not notice them, and the newcomers assumed an attitude of worldly wisdom that was almost uncanny.

Suddenly one of them flew to another tree as silently as before, but perhaps a little carelessly, because the female Wagtail immediately flew after him voicing her disapproval loudly.

The Kookaburra then did his best to look innocent, resulting in a most woebegone expression, reminiscent of the little boy caught in the pantry; only more ludicrous, because of his size in comparison with that of his assailant.

He sat on a branch with humped wings while the little bird flew swiftly around him, pecking his head and back until he could bear it no longer, and flew resignedly across the river.

Turning our attention to his mate, it was found that she had taken heed of the warning and disappeared.

But the Wagtail's troubles were not over, for, as she returned to her feeding ground, she found two Peewits (*Grallina*) greedily taking advantage of her absence, and they suffered the same fate, only this time both male and female Wagtails participated in the punishment.

While this was going on we saw a large Currawong (*Strepera graculina*) watching with great interest, the prized tract of river bank. He also had us included in his gaze, in case we had something better to offer, but, as we remained motionless, he seemed to make up his mind and flew one tree closer to the bank.

He also had a companion, but she was well out of the battle line, for when we looked for her she was about fifty feet from the ground in a dark *Pinus insignis* and barely discernible.

The indefatigable little birds returned and repelled the male Currawong. The female Currawong remained motionless, but one of the Wagtails soon discovered her hiding place and, chattering irritably, it once again prepared to do its work, but the sedate lady, however, left unhurriedly, and saved herself any threatened indignity, and Kookaburra Flat was once more serene and secluded.

We reluctantly crossed the river, wending our way homeward.

In the scrub two Kingfishers (*Halcyon sanctus*) were screaming and shrilling angrily, while a long gurgling chuckle floated through the stillness of the evening.

NOTES ON THE EXCURSION TO THE NEW MIDDLE HARBOUR PARK.

By H. McAnene.

At 1.45 p.m. on October 3 a small party of 16 members met the leader, Miss Dobbin, at Milson's Point and travelled by the Northbridge tram to the New Park at Middle Harbour.

Though rain had threatened, only a slight shower fell, as the tram reached the terminus.

Once off the road, the track was not well defined at first, and for about 50 yards we travelled over a rather damp and rocky area, crossing on the way a little runnel, in which frogs' spawn and water animals offered interesting investigation.

The chief interest of the members, however, seemed to be in the botanical specimens, though just to be out in the sweet fresh air in such beautiful and natural surroundings was payment enough.

All the bush was beautiful, but perhaps the most outstanding feature on this occasion was the wonderful grey-brown blooms of *Grevillea buxifolia,* the grey spider flower, which grows in great profusion quite close to the road.

Among the bushland flowers that decorated our track were many in different shades of blue. First noticed were some rather small specimens of Australian blue bells, *Wahlenbergia gracilis;* then a bright group of *Lobelia* and *Patersonia,* with blue petals unfolding. *Dampiera stricta* also added its masses of soft blue. Children call *Dampiera* the native "forget-me-not." Next in evidence were the mauves, pinks, and reds. *Kunzea capitata* with its little purple-blue, terminal bunches, like small posies, at the end of the slender stems; *Sowerbaea juncea* (the vanilla plant) with its delicate mauve-pink heads at the top of a red-like stem; a reddish-purple *Hardenbergia; Scaevola ramosissima* with the purplish stiff stemmed flower; *Philotheca,* a mauve-blue, resembling an *Eriostemon,* and a specimen of *Boronia floribunda.* The brilliant red of *Grevillea punicea,* red spider-flower; *Lambertia formosa,* the red honey-suckle that bears the "mountain devil" seed cases, and the red of the young leaves, and the covering of the flower buds of the *Angophora cordifolia,* compelled admiration. The white and red flowers of the *Calycothrix tetragona* appeared rather diffidently among the sturdier growths.

Among the paler flowers were patches of *Burchardia,* with white starry flowers, mauve centred, and mauve striped on the under side of the petals; in damp situations grew rather small, pale specimens of *Bauera rubioides, Epacris obtusifolia, E. microphylla, Lysinema pungens* (*Woollsia*), *Leucopogon ericoides, Actinotus minor* (small flannel flower), *Trachymene linearis, T. billiardieri, Hakea dactyloides, Callicoma serratifolia* in bud, and *Ceratopetalum gummiferum* (Christmas bush) were noted.

One member called our attention to a beautiful mass of *Clematis* clothing a gentle rise some distance from the road. The bright yellow pea flowers growing by the wayside were fine specimens of *Platylobium formosum* and *Pultenaea stipularis,* and *Dillwynia floribunda.*

Other plants noticed were *Drosera spathulata* (sundew), *Hakea pugioniformis, H. acicularis, Banksia serrata, Casuarina suberosa* with red flowers, a mistletoe in bud, *Leptospermum* with beautiful sprays of white blossoms, several varieties of *Acacia,* two varieties of *Persoonia* bearing fruit, and a beautiful *Eucalyptus* in full bloom, where the road curves up towards the township.

This is a rather casual list of the plants noticed without leaving the track. No doubt a systematic search would reveal two or three times the number. I missed the little terrestrial orchids, though the situation and soil seemed ideal for their growth. The least popular plant noticed was the cape weed, *Cryptostemma calendulaceum,* growing sturdily in the public thoroughfare.

A vacant allotment on which were some clean rocks formed an ideal place for afternoon tea. Here we recalled some of the sights enjoyed that afternoon—the beautiful stretches of Middle Harbour, the suspension bridge, views of Mosman, Cremorne, and Neutral Bay, the Spit, and Spit bridge, and the arch of the Harbour Bridge rising above all.

We are greatly indebted to our leader, Miss Dobbin, for her kindness and forethought in arranging this afternoon excursion for those who were unable to attend the whole-day excursion to Engadine.

NOTES ON EXHIBIT OF OLD REMAINS FROM ABORIGINAL MIDDEN AT QUIBRAY BAY.

By T. Dodd.

Quibray Bay, situated on the south-eastern corner of Botany Bay, was, hundreds of years ago, an extensive camping ground of the Quibray tribe of aborigines. The land has sunk, and the encroaching sandhills have covered all but a portion, a strip of land about half a mile long and varying in width from 60 or 70 yards to 5 yards at either end.

Here it is that many remains of stone age man in Australia have been found.

The specimens of chipped-back Illawarra knives or Eloweras, as they are now called, are composed of siliceous material, which is highly refractory and is readily worked.

The great age of several of these implements is evidenced by the amount of weathering they have been subjected to, while others are of more recent origin.

These implements are formed by breaking a stone so that a sharp edge is produced which often needs no further working, while the back, the gripping edge, is chipped to provide a firm hold. The amount of work on some of the tools is truly amazing and speaks volumes for the patience of these Palaeolithic men.

The writer has in his collection several specimens of ground axeheads, representing the Neolithic culture.

The skull, which I exhibited, is believed to be between 100 and 200 years old, and has been identified as that of an aboriginal woman of middle age. The teeth are in a good state of preservation, although the bone is in process of decomposition.

This was also found at the midden, exposed by the heavy rains, which had removed a considerable amount of sand. At a later date it is hoped to exhibit a further collection of specimens of interest to members.

A NOTE ON EXHIBIT OF AQUATIC LIFE.

The exhibit of aquatic life shown by me at our August annual meeting contained a variety of plant and animal life to be found in pools or ponds at that time of the year.

All the plants were suitable for aquarium purposes; some, such as *Vallisneria spiralis* and *Elodea densa* being valuable as oxygen producers, whilst all were ornamental.

Amongst the most noticeable were examples of *Juncus zebrinus, Potamogeton perfoliatus, P. tricarinatus, Myriophyllum verrucosum,* and a *Ranunculus.*

The animal life consisted of tadpoles, toads, four varieties of dragon-fly larvae, caddis-fly larvae, water boatmen, beetles, and common pond snails. The common pond snails, *Bullinus gradatus,* have been observed killing and eating young carp.—M. E. GRAY.

REVIEW—A NEW BIRD BOOK.

"What Bird is That?" by Neville W. Cayley, is a book of 319 pages, interspersed with 36 plates of coloured drawings of every species of bird in Australia. These are supplemented with 14 reproductions of photographs of the different class of country in which each bird is found—the open plains, the mangrove swamp, the sea shore, the mallee scrub, and the coastal forests, etc., all of which have their own particular birds.

The birds are not arranged under a uniform scientific classification, but are grouped according to their habitat. Thus we have two plates of the birds found in the coastal semi-tropical forests. On plate 26 are the 14 species of wrens peculiar to Australia, and on plate 1 are depicted nine of Australia's largest birds.

As there is a coloured illustration of every kind of bird there is no need to describe them, and the whole of the letterpress is devoted to recording their habits, life-histories, range, name. and classification, together with notes on their nests and eggs.

Mr. Neville Cayley, the author, knows his birds, both as an ornithologist and an artist, and by writing the descriptive portion in simple language and painting the birds in their dainty forms and colours, has given us the most complete and finest text-book of our bird fauna that has ever been produced in Australia.

It should be in the hands of every field naturalist in Australia, and will certainly be a great stimulus to the study and love of our feathered friends all over our great island continent.—WALTER W. FROGGATT.

NATURALISTS' SOCIETY OF NEW SOUTH WALES.

Proceedings.

AUGUST, 1931.

The annual meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, August 4, at 7.45 p.m.

Dr. G. P. Darnell-Smith (Director of the Botanic Gardens) in the chair, the President (Mr. W. W. Froggatt) with about 150 members and visitors present.

Presidential Address.—The President delivered a short address, entitled, "The Present Status of Economic Entomology," and pointed out a number of insect pests which have caused great trouble during past years, and which economic entomologists, both here and abroad, were continually studying.

Lecturette.—An extremely interesting lecturette, illustrated with lantern slides, was delivered by Mr. Anthony Musgrave (Entomologist to the Australian Museum), on "The Lives of Spiders."

Election of office-bearers for the year 1931-1932.

The following were duly nominated and elected to office for the ensuing year:—

President: Mr. W. W. Froggatt.

Vice-Presidents: Messrs. David G. Stead, A. E. Watson, Luke Gallard.

Hon. Secretary: Mr. R. A. Black.

Honorary Assistant Secretary: Miss Dolce Dobbin.

Hon. Treasurer: Mr. John Powell.

Hon. Editor: Mr. E. H. Zeck.

Hon. Librarian: Mr. G. G. Park.

Hon. Assistant Librarian: Miss L. Halloran.

Hon. Lanternists: Messrs. G. White and A. Booth.

Other Members of Council: Mrs. S. A. Howell, Misses D. Lawry, H. McAnene, L. Steinbeck, Messrs. P. E. B. Barnett, E. Gostelow, M. E. Gray, F. J. Ludowici.

Publication Committee: The President, Hon. Editor, and Hon. Secretary.

Annual Report.—Owing to the absence of the Hon. Secretary from Sydney, the Hon. Assistant Secretary (Miss Dolce Dobbin) read the annual report upon the activities of the Society during the past year.

Treasurer's Statement.—Mr. John Powell submitted his financial statement for the year ended July 31, 1931, which showed a credit balance of £10/0/6. Mr. Powell stated that some subscriptions were still outstanding.

Apologies.—Apologies for non-attendance were received from Messrs. G. Ross Thomas (Director of Education), C. H. Wickham, W. A. Rainbow, Harold S. Mort, W. L. Wearne, Archdeacon F. E. Haviland, Rev. Norman McKie, Mesdames L. Harrison, M. L. Lewis, C. A. Messmer.

New Members.—Fourteen new members nominated at the July meeting were noted to be formally elected at the next ordinary meeting.

Nomination of Members.—Miss Muriel Carne, Kirribilli.

Exhibition of Specimens.—For the numerous exhibits tables were arranged around the hall, and were decorated with large bowls of flowers.

Mr. E. Gostelow.—A large series of his paintings of various native birds.

Messrs. G. White and A. Booth were in charge of paintings of native flowers, the works of the late Mr. Adam Forster.

Mr. Luke Gallard demonstrated a frame containing a series of racks, holding specimens preserved in alcohol. The racks could be revolved for the convenience of the observer.

Mr. M. E. Gray.—Aquatic life, showing a variety of plant and animal forms common in pools.

September, 1931.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, September 1, 1931, at 7.45 p.m.

The President (Mr. W. W. Froggatt), in the chair, with about 50 members and visitors present.

Lecture.—Mr. M. B. Welch, B.Sc., A.I.C. (Economic Botanist to the Technological Museum), delivered a most interesting and instructive lecture, entitled, "Our Forests." Numerous black and white and beautifully coloured lantern slides were shown. The lecturer was accorded a hearty vote of thanks.

Excursion.—Reference was made to the excursion to Cheltenham Valley (on Saturday, August 29), where between 40 and 50 members met at the Cheltenham Railway Station and walked through the valley, where the wattles fringing the creek grew in profusion. During the afternoon, Mr. Froggatt and Miss McAnene named a large series of native flowers.

Correspondence.—Letter from Under Secretary for Lands, advising that an area of about 42,109 acres, in the Counties of Raleigh, Dudley, Clarke and Fitzroy had been reserved for public recreation (Government Gazette of 31/7/1931).

Parks and Playgrounds Movement of N.S.W., asking for suggestions re sites for parks, etc., and names of delegates to the committee.

Miss E. E. Gray notifying change of address.

Delegates.—Mr. W. W. Froggatt and Mr. David G. Stead were duly appointed to represent the Society on the committee of the Parks and Playgrounds Movement.

Treasurer's Statement.—Mr. John Powell tabled his monthly statement, which showed a credit balance of £18/11/1.

New Members.—Mrs. M. Spong, Sister M. Joseph, Mr. James Carr, Miss J. Reid, Mr. H. H. Reece, Miss N. McKellow, Mr. W. C. M. Elliott, Master Jan Davidson, Miss A. A. Frost, Mr. P. R. Maguire, Miss Hilda Bocklen, Mr. C. W. Corner, Miss Jeffreys, and Miss Buring were unanimously elected members of the Society.

Nomination of Members.--Miss D. W. Grierson, 397 Glebe Road, Glebe. Miss J. Wilson, 30 Alfred Street, North Sydney. Miss V. Ferguson, 69 Dunmore Street, Bexley. Miss Pearl K. Talbot, "Murilla," Short Street, Lindfield. Proposed by Miss H. McAnene, seconded by Mr. W. W. Froggatt. Mr. L. G. Harrison, 87 Clarence Street, Sydney. Nominated by Miss Lawry, seconded by Mr. W. W. Froggatt.

Resignations.—Miss K. Boyd, Francis Street, Artarmon, Rev. H. M. R. Rupp, St. Mary's, Church of England, Weston, forwarded their resignations, which were accepted with regret.

Exhibition of Specimens.—Professor Abbott—specimen of the flower of *Monstera deliciosa,* a native of Mexico.

Mr. Luke Gallard.—Beetle larvae.

Miss Kaylock.—Specimen of South African wattle.

OCTOBER, 1931.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, October 6, 1931, at 7.45 p.m.

The President (Mr. W. W. Froggatt) in the chair, with about 64 members and visitors present.

Members' Evening.—Mr. A. E. Watson exhibited a series of botanical specimens collected at Engadine.

Professor Abbott.—A large series of native plants.

Mr. A. Booth.—Microscope slides.

Mr. M. E. Gray.—A series of lantern slides.

Mrs. S. A. Howell—Lantern slides of three species of opossums, and also slides of some household insect pests.

Mr. N. A. Sachisthel.—A number of lizards, which his two daughters were studying.

Mr. Luke Gallard.—A number of slides of various moths and butterflies.

Miss K. Boyd sent from Melbourne a specimen of *Thryptomene calycina* which was collected in the Grampians.

Excursion.—Mr. A. E. Watson described the whole-day excursion which had taken place at the river, Engadine (on Saturday, October 3), where a party of 10 members had spent an enjoyable day.

Miss H. McAnene described the afternoon outing to the new Middle Harbour Park, at Northbridge, on October 3.

Correspondence.—Letter from the Field Naturalists' Society of Adelaide asking for donation of wild flowers for their annual show. The President stated that owing to the restrictions regarding wild flowers in this State, the usual donation of these would not be sent.

Letter from Sister M. Joseph, St. Joseph's Convent, Wombat, asking methods of pollination of flowers and features of various parasites.

Treasurer's Statement.—Mr. John Powell submitted his statement, which showed a credit balance of £20/13/4.

New Members.—Miss D. W. Grierson, Miss J. Wilson, Miss V. Ferguson, Miss Pearl K. Talbot and Mr. L. G. Harrison were unanimously elected members.

Nomination of Members.—Mr. S. T. Turner, Public School, Peak Hill. Nominated by Mr. W. W. Froggatt. Miss M. Hughes, Port View Road, Greenwich. Nominated by Miss Dolce Dobbin.

RESIGNATION OF MR. RALEIGH A. BLACK.

We regret to announce the resignation of our Honorary Secretary, Mr. R. A. Black, after three months' leave of absence, in consequence of his having received an appointment in Victoria.

Mr. Black, during his secretaryship, was an active and popular worker amongst our members, and was a regular attendant at our monthly meetings and excursions. His extensive knowledge of our native flora was always at the disposal of his fellow members.

Mr. Black was elected Secretary about the middle of 1927, and contributed articles on various subjects to "The Australian Naturalist," and also read notes and addresses upon natural history subjects at many of our meetings.

We wish him every success in his new venture, and will miss his genial presence at our gatherings.

THE HON. SECRETARY'S ANNUAL REPORT OF THE NATURALISTS' SOCIETY OF NEW SOUTH WALES, 1930-31.

The Naturalists' Society of New South Wales has entered its 21st year of usefulness, and I think we can fairly claim to have had an interesting and prosperous one. During the year (August, 1930-1931) we have held 11 monthly meetings, with an ever increasing attendance of members; at the June meeting 54, and 43 in July, on one of the most stormy nights of the year, with an average of 50 members.

At our monthly meetings the Council has been very fortunate in having illustrated lantern lectures by well-known specialists, as follows:—

September 2nd, 1930.—"Our Aborigines."—William W. Thorpe, Ethnologist, Australian Museum.
October 7th, 1930.—"Captain Cook and his Naturalists."—Tom Iredale, Conchologist, Australian Museum.
November 4th, 1930.—"The Ancestors of the Marsupials."—A. S. Le Souef, C.M.Z.S., Curator, Taronga Park Zoological Gardens.
December 2nd, 1930.—"Wild Life on the South Western Plains of New South Wales."—Keith C. McKeown, Assistant Entomologist, Australian Museum.
February 3rd, 1931. "Field Notes on Australian Birds."—H. W. Hamilton, Hon. Secretary, Gould League of Bird Lovers.
March, 3rd, 1931.—"Members' Night."—Lecturettes and Exhibits.
April 7th, 1931.—"A Geological Expedition in Central Australia."—T. Hodge Smith, Mineralogist and Petrologist, Australian Museum.
May 5th, 1931.—"Fossil Plants of Australia."—Dr. A. B. Walkom, Secretary, Linnean Society of New South Wales.
June 2nd, 1931.—"Economic Products of Australian Plants." —A. R. Penfold, F.C.S., Curator, Technological Museum.
July 7th, 1931.—"The Development of Meteorological Science and its Utility to Mankind."—D. J. Mares, Divisional Meteorologist.

We are greatly indebted to our honorary lanternists, Messrs. G. White and A. Booth, who have attended every meeting and operated at all these lectures.

We have had nine excursions within a radius of fifty miles of Sydney. They are arranged for the Saturday before the monthly meeting, so that specimens collected and notes made may be exhibited or read at the meeting. Excursions are usually under the leadership of one of our members. Among the more interesting ones was a trip to Mr. Linton's home at Mangrove Mountain, via Gosford, at a time when the wild flowers were at their best; and a visit to Dr. A. E. Finckh's garden of native trees, Kirkoswald Avenue, Mosman, where he had numbered lists of all his native shrubs and flowers. In May a visit was paid to the Quarantine Grounds, North Head, with the permission of the Chief Quarantine Officer (Dr. G. A. Metcalfe). This is an interesting area of untouched heath flora. Last month a party of 60 spent an afternoon in the bush round Engadine, under the leadership of Mr. A. H. Chisholm, who gave us an interesting lecturette upon the habits of the Lyre Bird.

We started the year with a roll of 250 members, two have resigned, and we have elected 44 new members during the year.

We have published two parts of our Journal, *The Australian Naturalist,* during the year—Part 4, Volume 8, October, 1930. In this number, besides the reports and notes, is a summary of the President's Address on the Fish Resources of the State, an article on the Quandong Tree and Diatomaceous earth, all of economic importance, an obituary notice of the late John Brazier, one of our original field naturalists, and an account of current notes and exhibits. Part 5, Volume 8, July, 1931, contains short papers on Araucaria pine trees; on the discovery of the eggs of *Heterojapyx gallardi;* notes on water snails, notes on butterflies, and abstracts of lectures and proceedings of the Society.

It is interesting to note that our Journal is read at home and abroad; we have many requests for it from abroad—among others, the Selbourne Society of London, and the Royal Society for the Protection of Birds, London. I congratulate the Editor, Mr. E. H. Zeck, for the care and pains he has taken in editing it.

We have had many additions to our Library by exchanges and gifts, and are desirous of making it of more use to our members.

We are very much indebted to our Honorary Librarian, Mr. G. G. Park, for the work and interest he has taken in arranging and cataloguing our books.

Our Society has acted in all movements brought under its notice regarding the protection of our native fauna and flora, and co-operated with the Parks and Playgrounds' Association.

NATIONAL MUSEUM VICTORIA.

The Australian Naturalist

Vol. VIII. JULY, 1932. Part 7.

OBITUARY.

Arthur M. Lea, F.L.S.

Arthur M. Lea was a foundation member of the first Field Naturalists' Society of New South Wales, founded in 1890.

The writer vividly recalls his first meeting with him, when, on a collecting excursion of the members to Mosman in the early summer of 1890, Lea came along, an active, thick-set young man, with a smile for everyone and a large bag of bananas, which he distributed among us. He was a keen collector in those days, a true field naturalist, and, at the first Annual Exhibition of the Society, in St. James' Hall, on the 5th to 7th April, 1893, he exhibited a collection of beetles.

He was first appointed to the staff of the newly-created Department of Agriculture of New South Wales, under A. Sydney Olliff, the first Government Entomologist, and was a collector and field investigator. When the staff was reduced he applied for a position in West Australia, and there on the staff of the Bureau of Agriculture did a great deal of field work.

From there he went to Tasmania, and was Government Entomologist, always collecting, studying and mounting insects; but he was never fond of economic entomology, and wanted to get into a museum. His opportunity came when Mr. J. G. O. Tepper retired from the position of Entomologist to the Adelaide Museum; Lea applied for the position, got it, and held it until his death in February this year.

He was an energetic collector in the field and also a voluminous writer; he contributed his first paper (Descriptions of New Species of *Bostrychidae*) to the Proceedings of the Linnean Society of New South Wales in 1893, and has been a steady contributor every year since. Besides this Journal, many papers appeared in the Royal Society of South Australia, and other Australian and foreign scientific journals.

For some years he has been the outstanding authority on Australian Coleoptera, corresponding with entomologists all over the world. He spent an immense amount of time identifying and describing new species of beetles, for they came to him for determination, from all parts of Australasia. Through his activities the Adelaide Museum has been so enriched with entomological specimens that their collection is the most extensive and valuable in the Commonwealth.

Lea never lost his genial smile and happy disposition, and kept his youthful ways to the last; he had not time to get old in heart.

He was born in Sydney, 1869; died at Adelaide on February 29, 1932.

—WALTER W. FROGGATT.

GEORGE GETHIN PARK.

From June, 1929, Mr. George Gethin Park was Hon. Librarian to the Naturalists' Society of New South Wales, and an active member of the Council. He not only regularly attended the monthly meetings, but was the life and soul of our Saturday excursions, ready to help everybody, and at our last annual meeting he assisted in arranging our musical programme.

His fellow naturalists will miss their cheery companion.

Mr. Park was a true nature lover, and specialised in drawing and painting our native flowers from life, many of which he exhibited at our meetings. He was a man of many parts, for, besides his artistic accomplishments, he was well-known in the musical world. In Signor Hazon's time he was flautist with the Sydney Amateur Orchestral Society and Philharmonic Society and other musical Societies, and was Secretary of the New South Wales Military Band. He also, in later days, devoted much time in conducting and training church choirs.

He was born in Sydney, February 15th, 1868, and died May 31st, 1932, in his 64th year. He was the only son of the late Mr. Thomas Park, who for 60 years carried on the business of chemist and druggist in Sydney.—W. W. FROGGATT.

THE IDENTITY OF *PSALTODA HARRISI* AND THAT OF A NEAR ALLY.

By E. C. Chisholm, M.B., Ch.M., R.A.O.U.

While spending holidays on the Camden Haven River, near its mouth, at Christmas, 1930, and 1931, I came across four species of cicadas, and later a fifth was sent me from there.

These were all black or mottled brown, and were the following species:—

(1) *Henicopsaltria perulata,* Guerin.
(2) *Abricta curvicosta,* Germar.
(3) *Psaltoda harrisi,* Leach.
(4) A close ally * of (3) *P. harrisi,* but smaller.
(5) *Tamasa tristigma,* Germar.

It is with (3) *P. harrisi* and (4) its near ally that I am especially dealing here. These two species both go by the name of *Psaltoda harrisi,* and authorities, specialising in this group, going by their general structure, form, colour and variability, hold that they are one species. I want in this paper to show that they are distinct, and give my reasons for differing from this generally accepted opinion. No one seems to have studied these two forms in the field, though the small boy would recognise the difference immediately on hearing the song of either species. I have taken particular note of this aspect of the case.

There is a certain amount of marked difference in colour, size, presence, or absence of mottling of wing, and certain veins of tegmen of fore-wing, and other important differences in structure. There is admitted variability in size and colour of *P. harrisi* (3), which is the larger, and in this there is a thickening or cloudiness of certain veins near costa, towards apex of fore-wing, which is entirely wanting in its ally (4). Although this varies to some extent in certain individuals of *P. harrisi* (3), still it is always there, and this in itself should be one strong point of differentiation.

P. harrisi (3) is also a larger insect, although a few forms, smaller than usual, are found. It is very variable in coloration, showing greenish or brownish tints in some specimens, while the allied species (4) is, in all I have seen, invariably black, with faint reddish markings, and, moreover, it seems to be more constant in size.

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* Herein described as *Psaltoda longirostris,* n.sp.

The points which clearly distinguish the two as being separate species are the relative lengths of the probosces and the colour of the frons, which is constant in each species.

The proboscis of *P. harrisi* (3) only just reaches below the junction of the trochanter with coxa of second pair of legs, while that of its ally (4) reaches to beyond the coxo-trochanteric joint of the third pair of legs, and the structure of the proboscis of each is quite different—e.g.: The proximal segment of the labial sheath of *P. harrisi* (3) is very short, only about one-sixth of the length of middle segment, whereas in the allied species (4) it is much longer and about equal in length to the middle segment. The distal segment of (4) is relatively longer than that of *P. harrisi* (3). These facts alone are sufficient evidence of the two belonging to two distinct species.

The colour of the frons in *P. harrisi* (3) is invariably greenish or brownish-yellow, while that of its ally (4) is black.

The main functional difference, which, to anyone who has studied the species in the field, at once puts the distinction of the two species beyond doubt is the song, which, of either, once heard could never be confused one with another.

P. harrisi commences with a series of clear, shrill, short notes, with no interval between them; these gradually become longer, and, finally, one continuous note, much as that of *Cyclochila australasiae;* in fact, it was for that cicada I was looking when I first heard its song.

The song of its ally (4) is in a lower key, with a rattle in it. Each note lasts about five seconds, then there is a pause of two or three seconds. The note and the pause continue for some time, and are constant, in rythm, but the song never becomes continuous.

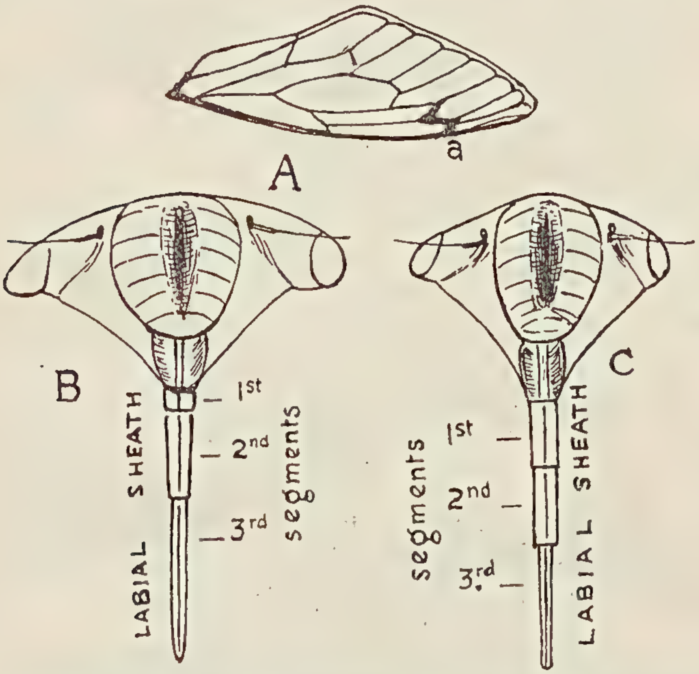
P. harrisi (3) —— —— —— —— —— ———— ————
Allied species (4) ∿∿∿ ∿∿∿ ∿∿∿ ∿∿∿

(4) was found largely on *Casuarina suberosa* (she-oak), and *Banksia serrata,* low down on the trunk, while *P. harrisi* (3) was mostly on *Angophora intermedia,* high up and rather difficult to secure.

Another point of importance: At Christmas, 1930, I never saw or heard *P. harrisi* (3), but only its ally (4), while Christmas, 1931, both were prevalent, and on showing *P. harrisi* (3) while in the act of singing to two school boys and asking them to try and catch me some; they invariably caught me *P. harrisi* (3), although (4) was there in equal numbers.

Both species have a white area on each side of the second abdominal segment, which is really a yellow spot covered with a silky white pubescence. In *P. harrisi* (3) this area is larger and whiter than in its ally (4), and less pointed towards the dorsum.

The measurements of the body lengths of nine specimens of *P. harrisi* (3) averaged 33.01 mm., the maximum being 36.0 mm., and the minimum 30.0 mm. Width across eyes averaged 14.75 mm., maximum 15.6 mm., minimum 13.8 mm. Average length of fore-wing (tegmen) of four specimens 43.62 mm., maximum 44.5 mm., minimum 42.5 mm.



A—Forewing of No. 3, natural size. a—mottling of veins.
B—Head of No. 3 enlarged. C—Head of No. 4 enlarged.

I have only one specimen of the allied form (4) available, which is about the average size of many I have seen. In this the total length of body is 23.0 mm. Width of head, across eyes, 11.0 mm., length of fore-wing 34.0 mm., so that the length of body of *P. harrisi* (3) is practically 10 mm. more than that of its ally (4), width of head 3.75 mm. more, and length of fore-wing nearly 10 mm. greater than (4).

Average measurements in millimetres:—

	Length of body.	Width of head.	Length of fore-wing.
P. harrisi (3) ..	33.01	14.75	43.62
Allied, sp. (4) ..	23.0	11.0	34.0

The points of difference between the two species are as follows:—

	P. harrisi (3).	Allied species (4).
1. Size.	Greater in all dimensions.	Less.
2. Colour.	Variable.	More constant.
3. Variability in size.	Marked.	Not marked.
4. Mottling on fore-wing.	Always present on certain veins.	Fore-wings clear.
5. Length of proboscis.	Reaching to just below coxo-trochanteric joint of second pair of legs.	Reaching to just below coxo-trochanteric joint of third pair of legs.
6. Length of proximal segment of labial sheath.	Proximal segment very small, almost rudimentary about one-sixth length of middle segment.	Proximal segment about as long as middle segment.
7. Colour of frons.	Greenish-yellow or brownish-yellow.	Black.
8. Song.	Continuous after start, shrill and smooth.	Interrupted, rattling, and in a lower key.

When all these points of difference are taken together I claim that I have made a good case for *P. harrisi* (3) and its ally (4) being undoubtedly distinct species. As (3), known as *P. harrisi,* the larger form with mottled fore-wings appears to be the type of *Psaltoda harrisi,* I have therefore proposed the name of *Psaltoda longirostris* for (4), the smaller clear-winged species, in allusion to its relatively longer proboscis.

THE TREES OF NEW SOUTH WALES.

(Abstract of Lecture.)

The trees of this State offer a very interesting study, as conditions prevailing for tree growth provide strong contrasts and differences. We pass from rich coastal areas with high rainfall to the heat-blasted plains of the far west, where the rainfall is almost a negligible quantity. On the one hand we have the Swamp Oak and Paper Barks on tidal flats, and on the other the Snow Gum at the limit of tree growth on Mount Kosciusko. There is consequently a wide range of species and forms, all of which are adapted to the peculiar requirements of their habitat.

Our tree flora is also rich in utility and beauty. It provides us with most durable and ornamental timbers, it yields fodder for starving stock, shelter and shade for both man and animals, and gives us a unique and typically Australian genus in the Eucalypts.

Broadly speaking, the State can be divided into four main divisions, the boundaries being contour lines drawn from north to south. These divisions, viz., the Western Plains, Western Slopes, Tablelands and Coast, are fairly well defined, and have each a fairly distinctive flora, although naturally having some degree of merging and a number of species in common. Conditions in the Western Plains Division are not favourable to tree growth on account of the low rainfall and hot, dry summers, but nevertheless the flora is both interesting and useful. Kurrajong, Mulga, Supple Jack and other species all provide useful drought fodder; valuable timber is yielded by such species as Cypress Pines and River Red Gum, and attractive ornamental species are found in the Wilga and Myall. The Leopard Wood has an interesting life-history, starting as a tangled growth of long, thin branches and then sending up a main shoot which is protected by the surrounding branches.

The Western Slopes Division covers important agricultural and pastoral areas on which a good deal of the timber has been cleared. Building and fencing material supplied by the Cypress Pines, Ironbarks and Boxes have been of great assistance in the progress of settlement, apart from their ornamental value in the ordinary timber market.

The native tree flora of the Tableland Division is a fairly distinctive one, although typical species of the Western Slopes Division ascend in parts to intermingle with the true Tableland species. On the eastern side some of the coastal species intrude into the Division, making their way up gorges and valleys which shelter them from cold and drying westerly winds. In this Division the cold country species of Europe and America reach their best development, and make beautiful ornamental studies, apart from their general usefulness. The various species of Eucalypts, known locally as Boxes, Stringybarks, Gums, Bloodwoods, Ashes, Peppermints, Ironbarks and Messmate constitute by far the largest proportion of the native tree flora, and include a wide range of appearance and utility.

In the Coastal Division three types of forests are present—Brush or rain forests, Eucalypt forests, and vegetation on tidal areas subject to flooding. The brush or rain forests are characteristic of fairly heavy and rich basaltic or alluvial soil in districts which enjoy good rainfall, particularly during the summer and autumn months. Brush species, however, are also found on the poorer classes of soil, provided the rainfall is high, and under artificial conditions a good rainfall often appears to be of more importance than a rich soil. In the northern subdivision the brushes once occupied fairly extensive areas, but a good proportion of these have been cleared during the process of settlement. In the Illawarra district good brush forests were fairly common, and there are still remnants of these which have escaped the axe of progress. Patches of rain forests occur in many parts of the Division, particularly on deep moist soil in sheltered sites. Here and there invasion of the Tableland Division is made by typical brush species which take advantage of the shelter afforded by gullies, and in isolated areas of the Tablelands, such as at Mount Wilson, a fairly typical brush flora is found.

A large number of species go to form the dense growth of the brush forests. A proportion of these are small growing and form an under-storey to the taller, more valuable trees, and, although serving to protect the forest floor, are of minor importance only. The larger trees of the brushes include a number of valuable species, as varied in their utility as in their botanical distinctions. The most valuable of the timber-yielding species include Red Cedar, Silky Oak, Hoop Pine, Teak, and White Beech. Excellent ornamental and shade trees are supplied by such species as Tulip, Rosewood, Black Bean, Silky Oak, Brush Box, and many other species.

The brush forests, indeed, suffer from an embarrassment of richness. Owing to the presence of such a large and varied number of species and the scattered distribution of these, it is difficult to obtain any one species in the large quantities which is desirable for efficient handling and marketing. Generally speaking, brush species are shallow rooting, but at the same time they are able to withstand some degree of drought, moderately prolonged dry weather being often experienced, particularly during late winter and spring months. The capacity for drought resistance has been amply demonstrated by a number of species when planted artificially, the outstanding examples being the Silky Oak and White Cedar, both of which flourish under the dry and trying conditions of the Western Plains Division.

—R. H. A.

JOADJA, THE FORGOTTEN TOWN.

By T. Dodd.

Nestling in an old world valley, hemmed in on all sides by towering mountains, rich in the mineral that made this little town of 1,000 men and their families so well known half a century ago, lies Joadja.

It is said to have derived its name from one, John Hedges or Hedgers. I made inquiries from residents—some who had in their younger days worked in the mines—the tale was always the same, but there seems to exist some uncertainty about it. The old train line, which can be traced for miles, once connected with the main southern line at Mittagong, some 17 miles away.

In the past it was the scene of activities of the Australian Kerosene Oil Co., which is said to have made £4.000,000 from the shale deposits found in the surrounding mountains. Their operations were terminated at the beginning of this century. In 1874 the shale was taken by pack-horse up a steep winding path, known as the Chinaman's track; later, a cable tramway, 300 yards long, was constructed, almost straight up the face of a mountain to the west of the old track. The engine house and winding gear are still in place, and the line, like a deep scar, stands out between the heavy timber. Below one sees the five big stacks, which one time belched forth black smoke, seeming lilliputian amongst the giant mountains. Most of the buildings refineries, offices, blacksmiths' shops and houses are bramble-covered ruins. In Russell's gully are the retorts—some of these have fallen out, others are more or less as they were left. Sturdy young gums grow where once men fed fires. Two, long, high heaps of grey ashes are evidence of this one-time hive of industry.

On the other side of the creek stand three red walls and concrete steps of the large building, which served as church, dance hall and public meeting place. The manager's house is in good order, and is occupied by a caretaker, not of the buildings, but of the grazing property of which it is now a part. Trees in the once extensive orchards have recently been felled and few now remain. Passing on, a stone structure, dated 1882, and once the Public School, is seen. On a wall hangs a chart of the solar system and planets, and portion of the "golden rules" to be observed by scholars. Some desks are still in position, while outside hangs the old bell which once summoned the children to their studies. One wonders where they are now! Hidden away in a corner, on the bank of Graveyard gully, are the weather-worn headstones of those who died.

Shale abounds there, only the top layer having been worked, while coal is nearly as plentiful. Some enterprising men are soon to open on a small scale; a few months may once again see the crude oil flowing, where once thousands of gallons flowed daily.

Pines border the creek, avenues of sycamores, firs, silver poplars and acacias all grow in profusion. The stately elms. which once formed long avenues, have been felled owing to the enormous number of suckers they produce, now are lying in long brown rows. Rabbits are everywhere; lowry, king, and rosella parrots add colour to the varied shades of green in the foliage. Magpies, currawongs, leatherheads and pigeons all do their share, while eagles hover high above the valley like sentinels. Numerous small birds are everywhere, and show no sign of fear. Lace lizards are heard to enter the water with loud splashes, while at night the air is resonant with the croaking of frogs and shrill calls of green tree locusts. In the hills the hoot of the owl vies with the yelp of the fox. Many wombats' holes are to be seen, and on the slopes one catches glimpses of wallaroos and pheasants.

SHARKS.—Mr. Gilbert P. Whitley, in his address to the Society, on "Sharks," December 2, 1931, dealt with their reproduction, food, commercial value and methods of capture.

The lecturer stated that in ten years there had been fifteen persons attacked by sharks, eight of whom had died. There were about eighty distinct kinds of sharks, the majority of them harmless to man. The record weight of a "Mako" was 798 pounds, and that of a "Thresher" 915 pounds; the smallest known shark reached the length of six inches.

NOTES ON KILLING AND SETTING LARGE MOTHS.

By Luke Gallard.

First secure a large bottle with a well bevelled neck, into which place about half a teaspoonful of crushed cyanide of potassium (poison). Then cover the cyanide with plaster of paris, mixed to the consistency of cream, so that there is about one-half an inch of plaster. Allow the plaster to set for about fifteen minutes, then cork tightly with a long cork, free from knots, so that the poisonous fumes do not escape.

To place a moth in the bottle, hold it at the base of the wings with the thumb and fore-finger, keeping the wings pressed close to the insect's body, and insert it into the killing bottle "tail" first. If this method is followed the moth will be easily removed when dead, for when the bottle is tilted the wings will pass along the smooth surface without losing their scales. When a moth is placed into the bottle "head" first and allowed to die that way, the wings expand and make its removal difficult.

Moths should be mounted as soon as possible—that is, before the wings and legs become rigid.

To mount, or set, pass a pin of suitable size through the middle of the thorax, and pin the moth in the cavity of the setting board, spread the legs to the required position, and set the wings out to the angle required; then, if necessary, fasten them into position with very fine pins (Nos. 16 or 18) and make the wings secure by pinning strips of paper across them.

Some moths become rigid or set in a few days, while others will require a full week or more.

Setting boards can be bought ready-made, but they are easily constructed at home. A very good one may be made from pith of the Aloe, *Agathis*, sp., if cut into strips about one inch thick and about five inches wide. Body cavities, of the required size, may be cut in this material, and for large moths may be three-fourths of an inch wide and half an inch deep. If the body cavity is too deep for the moth being mounted, place a small piece of cotton-wool under the abdomen to keep it up to the height required.

I prefer setting boards made of this material, as they are lighter than cork, and the pins penetrate them much more easily,—even number eighteen pins will penetrate this pith easily.

While the specimens are mounted and drying on the boards, it is advisable to protect them from mice, destructive insects, etc. A deep box, with a ventilation hole in each end, covered with perforated zinc or gauze, makes a good receptacle. It is advisable, also, to keep an amount of naphthalene or other insecticide in the box as a repellant for Anthrenus beetles, etc.

With some of the large timber moths, it is best to remove the contents of the abdomen and to stuff them with cotton-wool to prevent grease appearing. If this is not done, the oil in the eggs or other body substances which exude through the skin discolour the moth and cause the scales to adhere to the body, thus spoiling the appearance of the specimen.

[I have found that even small examples of the "timber moths" will develop grease, even before being mounted, if left in a killing bottle longer than necessary, especially so if chloroform be used.—Editor.]

EXCURSION TO EASTWOOD.

On Saturday, November 28, 1931, members met at Eastwood Station, and, by arrangement, a special 'bus carried them to within one hundred and fifty yards of the site selected by the leader (Mr. Gallard) as a base, and where, earlier in the day, he had placed supplies of drinking water.

It was an ideal spot for afternoon tea, and a good centre around which the various sections of the party could collect specimens.

Near-by was a large waterhole, used by some of the people of Marsfield as a swimming baths. Shortly after arrival, however, members were startled by peals of thunder, and in a few minutes, rain, accompanied by scattered hailstones, was falling. This caused everyone to seek shelter in caves or under overhanging rocks, where, for a time, all enjoyed the novelty of being cave-dwellers. When the rain ceased billies were boiled for afternoon tea, while the bush dried a little.

Mr. Gallard very kindly supplied a box of excellent local peaches, which were greatly enjoyed by members.

The rain somewhat spoiled the trees for collecting specimens, but Mr. Gallard exhibited a jar containing beetles collected by himself from the same locality earlier in the week. Amongst these were "Stag" beetles, "Fiddler" beetles, three species of *Anoplognathus,* Botany Bay diamond beetles, *Anthribidae,* a number of Buprestids, *Harpobittacus,* and a Sialid.

Some of the members examined the creek, where quite a number of butterfly nets were used, with good effect in the capture of aquatic specimens. Many small fish, prawns, dragon fly larvae, water striders, Gyrinids, Nepids, etc., were secured.

When travelling back along Balaclava Road, the leader pointed out some large Christmas bushes, which were heavily laden with blossoms, and also showed members the large mansion of Marsfield known as Curzon Hall.

EXCURSION TO THE BOTANIC GARDENS.

On Saturday, February 27th, 1932, the President (Mr. W. W. Froggatt), met about 45 members and friends at the Domain gates entrance to the Gardens. The President then gave an account of what the Botanic Gardens and surroundings looked like a hundred years ago (1832).

The handsome stone gateway where we entered was not erected until 1873; before that a wooden gate was there. In those days, a road led from the gate across the outer domain, which was thickly covered with low scrub and scattered gum trees, to St. James' Church.

Old Government House was at the corner of Phillip Street, and the Governor's domain consisted of all the land from the Tank Stream in Pitt Street, Macquarie Street, round Hyde Park down to St. Mary's Road into Woolloomooloo Bay. It comprised the Government House grounds, Garden Palace grounds, the Botanic Gardens, the outer Domain and Hyde Park.

The Botanic Gardens, always spoken of in the plural, consists of three originally distinct sections—the upper or kitchen garden on the left-hand side of the gateway across the bridge towards the Garden Palace grounds, the middle garden containing the offices and herbarium bounded by the old stone wall below the aviaries, the lower garden which extends round Farm Cove and to a point near Mrs. Macquarie's Chair.

After entering the Gardens' gate the party turned down the walk, past the offices. Looking across to the left, an old fig tree, surrounded by a rockery, was seen, this, marking the site of the old garden cottage, demolished many years ago, where both Allan Cunningham and his successor, James Anderson died.

The "Wishing Tree," passed on the left, was a well-grown young Norfolk Island pine, a hundred years ago, and beyond it were two more great pines about the same age. Near the largest pine, close to the wall, Joseph Gerrald, one of the Scotch martyrs, was buried.

After viewing the aviaries, which once also contained a collection of animals and a monkey house, the party passed from the middle garden into the outer garden, along the wall of which was a row of "swamp mahogany" trees, *Eucalyptus robusta,* over one hundred years old, planted originally along Mrs. Macquarie's Road, outside the wall which once extended from Government House, in Phillip Street, to the steps up the rocks, leading to Mrs. Macquarie's Chair.

Across the flat below lay historic ground, for, just beyond the Memorial Kiosk (erected to the memory of the late J. H. Maiden), was the land in which the first wheat grown in Australia was planted in 1788.

Along the upper road was a fine gum tree, *Eucalyptus tereticornis,* older than the Gardens; one of the original gum trees growing there, when the outer garden was reclaimed, and a little higher up was a patch of rather ragged "she oaks," *Casuarina glauca,* as old as the Gardens.

A group of the same species of "she oaks" were on the ridge, near Macquarie Street, until destroyed when the Mitchell Library was built.

The Australian trees and shrubs along the outer railings were examined, and the members then crossed the flat, where the King's tree, *Melaleuca leucodendron,* planted just 51 years ago by the King, then a midshipman on H.M.S. Bacchante, was seen. The obelisk, in the pond, erected to the memory of Allan Cunningham, was next visited.

The President mentioned that one hundred years ago there was no stone wall around Farm Cove, and that the sea came up in a V-shaped bay, up to that point of the flat, the flat having been built up and filled with silt dredged from Circular Quay and around Farm Cove.

The members of the party had afternoon tea in the shade of a large leafed Indian pine, *Pinus longifolia,* and later visited the glass-houses, where Mr. Ward met the party and spent over an hour with them, showing them the interesting propagating houses, the Solomon collection of Cactus, aquatic plants, foliage plants, grasses, ferns and beautiful orchids.

THE VEGETATION OF MONTAGUE ISLAND.

By F. A. RODWAY.

On April 4, 1932, I paid a visit to Montague Island, seven miles from Narooma, on the South Coast. Most of the day was spent ashore, and so a fairly complete collection of the vegetation was made.

The island is about a mile long and has an area of about 310 acres. It is formed of two portions, joined by a low-lying neck, through which the sea breaks in heavy weather. The northern piece is of basalt, the southern of granite. A lighthouse, and three houses for the staff, are on the summit of the southern portion, and were built in 1881.

The fifty years of occupation probably accounts for the large number of introduced weeds, and, although there are now no trees, except a fig at the residence of the head keeper, I found a few rotting stumps of Banksia (probably *B. integrifolia*).

The vegetation consisted of: *Alternanthera denticulata* R.Br., *Aster subulatus* Michx., *Chenopodium carinatum* R.Br., *C. murale* L., *Cotula coronopifolia* L., *Dichondra repens* Forst., *Enchylaena tomentosa* R.Br., *Erigeron linifolius* Willd.. *Glycine clandestina* Wendl., *Gnaphalium luteo-album* L., *Hypochoeris radicata* L., *Kennedya rubicunda* Vent., *Leucopogon Richei* R.Br., foliage only, *Marsdenia rostrata* R.Br., *Oxalis corniculata* L., *Pelargonium australe* Willd.. *Phytolacca octandra* L., *Plectranthus parviflorus* Willd., *Portulaca oleracea* L., *Rhagodia hastata* R.Br., *Rumex acetosella* L., foliage only, *R. Brownii* Campd., *Solanum nigrum* L., *Stephania hernandifolia* Walp., *Taraxacum dens-leonis* L., *Tetragonia expansa* Murr., *Tillaea sieberiana* Sch., *Trifolium repens* L., *Urtica incisa* Poir., *Wahlenbergia. gracilis* A.DC. (large and small flowered forms), *Westringia rosmariniformis* Sm., ——— *Commelina cyanea* R.Br., *Cynodon dactylon* Pers., *Eragrostis leptostachya* Steud., *Hypoxis hygrometrica* Lab., *Juncus effusus* L., *Panicum sanguinale* L., *Pycreus polystachyus* Rottb., *Scirpus nodosus* Rottb., *Sporobolus elongatus* R.Br., *S. diander* Patis., *Stenotaphrum secundatum* Wal., *Themeda australis* Steph.. *Xerotes longifolia* R.Br., ——— *Asplenium marinum* L., *Cheilanthes tenuifolia* Sw., *Pteridium aquilinum* Kunth.

The northern portion of the island is covered with tussocks of *Xerotes longifolia* and *Sporobolus diander* to the exclusion of almost everything, except *Marsdenia rostrata,* which is plentiful amongst the tussocks.

NATURALISTS' SOCIETY OF NEW SOUTH WALES.

Proceedings.

NOVEMBER, 1931.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, November 3, 1931, at 7.45 p.m.

The President (Mr. W. W. Froggatt), in the chair, with about 100 members and visitors present.

Lecture.—Mr. E. C. Andrews delivered an extremely interesting and instructive lecture on various phases of Japanese life, illustrated with numerous and beautifully coloured lantern slides. The lecturer was accorded a hearty vote of thanks.

Excursion.—Mr. A. E. Watson described the enjoyable outing to the old Rifle Range, Randwick, on Saturday, October 31. Unfortunately, owing to inclement weather, only 16 members attended. The walk around the seashore from Maroubra Beach to Lurline Bay was full of interest. Wild flowers were in abundance on the old range.

Treasurer's Statement.—Mr. John Powell tabled his monthly statement, which showed a credit balance of £22/14/-.

New Members.—Mr. S. T. Turner and Miss M. Hughes were unanimously elected members.

Exhibition of Specimens.—Mr. G. G. Park, specimen of green bottle brush, *Callistemon pinifolius.*

Miss Paterson.—Specimen of Nasturtium.

Master John Ludowici.—Specimens of terrestrial orchids and a large hawk moth.

Mrs. S. A. Howell.—Specimens of thrips and a blue moth.

Mr. Luke Gallard.—Butterfly pupae and codlin moths.

Mr. R. A. Black.—Specimens of flowers collected during his three months' absence in the country.

Mr. W. W. Froggatt.—A Botany Bay cockroach, captured at Randwick.

Professor Abbott.—Specimens of Statice and *Crotalaria laburnifolia.*

Mr. R. A. Black told of various incidents in his tour of the country, and stated that, as he was going to Melbourne it was possible that he would remain in Victoria, in which case it would be necessary for him to resign his position as Hon. Secretary to this Society.

DECEMBER, 1931.

The ordinary monthly meeting of the Society was held in the Lecture Hall, Australian Museum, on Tuesday, December 2, 1931, at 7.45 p.m.

The President (Mr. W. W. Froggatt), in the chair, with about 50 members and visitors present.

Lecture.—Mr. Gilbert P. Whitley (Ichthyologist, Australian Museum), delivered a very interesting and instructive lecture on Australian sharks, illustrated with numerous lantern slides. Mr. Whitley's lecture was greatly appreciated, and a hearty vote of thanks was carried by acclamation.

Excursion.—Mr. Gallard read a report on the visit to the Eastwood district.

Business.—Following on the resignation of Mr. R. A. Black, Mr. K. C. McKeown, Assistant Entomologist, Australian Museum, was duly appointed Secretary to the Society and was introduced to members.

Following on discussion, it was decided that the Society would take no action in regard to the float for the Sydney Harbour Bridge opening pageant.

Final arrangements were made for the Christmas party to be held by members.

Treasurer's Statement.—The Honorary Treasurer (Mr. John Powell), tabled his monthly statement, which showed a credit balance of £19/18/1.

Exhibition of Specimens.—Professor Abbott: Boars' tusks, from the New Hebrides, used as armlets and ivory nuts.

Mr. J. Powell.—Specimen of West Australian waratah.

Mr. Luke Gallard.—A series of beetles collected on flowers at Eastwood.

Mrs. S. A. Howell.—Lizards' eggs.

Mr. M. E. Gray.—Water snails and a variety of same (exhibited on behalf of Miss Ivy Pink).

Mrs. ————————————South African wild flowers

FEBRUARY, 1932.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, February 2, 1932, at 7.45 p.m.

The President (Mr. W. W. Froggatt), in the chair, with about 50 members and visitors present.

Members' Night.—Lecturettes and notes were given as follows and specimens exhibited.

Mr. W. W. Froggatt.—A very interesting and unusual gall collected at Berowra.

Mrs. S. A. Howell.—Nests of the Bul-Bul and Silver-eye, which were described.

Professor A. J. Abbott.—Specimens of native juniper, scarlet seeded rush, *Xerotes,* pine-leaved geebung, native "cotton" and native "pear."

Mr. Luke Gallard.—Sections of potato plants, showing brown olive scale, specimens of fleas, flies, and timber moths collected at Berowra; also a dahlia with two flower-heads in one (fasciation).

Mr. Harrington.—Specimens of turtles, 10 days old, from the Barrier Reef. Mr. Harrington stated that these turtles were observed to take 9 weeks and 2 days to incubate, and that only about 2 per cent. of the turtles hatched survive.

Specimen of *Persoonia* and fig tree grown on an island in the Reef.

Mr. A. E. Watson.—Specimens of home-spun silk.

Mrs. E. H. Zeck.—Aquatic plants, *Azolla* water fern, *Riccia, Elodea densa,* and *Potamogeton,* suitable for aquaria; also Moon Cactus, with graft of another species thereon.

Mr. D. G. Stead.—Notes on the Nankeen Crane, seen at Watson's Bay.

Mr. P. E. B. Barnett.—Interesting lantern slides of spiders.

Mrs. S. A. Howell.—Lantern slides, showing opossums, mantids and a waratah with 10 flower-heads.

Mr. M. E. Gray.—Notes on fresh water sponges. He stated that these were to be found at this time of the year, and that Mr. Livingstone, of the Australian Museum, would be pleased to receive specimens.

Excursion.—Mr. W. W. Froggatt described the outing on the previous Saturday, January 30, 1932, to Kuringai and Berowra, under the leadership of Mr. Blakely, which was enjoyed by both whole-day and half-day excursionists.

Treasurer's Statement.—Mr. John Powell submitted his monthly statement, which showed a credit balance of £26/15/5.

Nomination of Members.—Dr. E. C. Chisholm, Comboyne, N.S.W. Proposed by Mr. W. W. Froggatt, seconded by Miss D. Dobbin. Mr. R. D. Miller, Citizens' Building, 46 Martin Place, Sydney. Proposed by Mrs. F. J. Ludowici, seconded by Miss D. Dobbin. Miss A. Ratcliffe, "Tyramon," 6 Sully Street, Randwick. Proposed by Miss White, seconded by Miss D. Dobbin. Miss Nellie Taylor (junior member), "Brynathyn," Dudley Street, Hurstville. Proposed by Mr. W. W. Froggatt, seconded by Miss D. Dobbin.

MARCH, 1932.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, March 1, 1932, at 7.45 p.m.

The President (Mr. W. W. Froggatt), in the chair, with about 60 members and visitors present.

Lecture.—Mr. R. H. Anderson, B.Sc. (Assistant Botanist, Botanic Gardens), delivered a most interesting and instructive lecture on "Forest Trees," illustrated with numerous lantern slides, depicting the trees of the western plains, tablelands and coastal districts. The lecturer also gave an account of their value as timber and fodder trees, and at the conclusion of his lecture was accorded a hearty vote of thanks.

Correspondence.—Letter from Hon. Secretary, Native Flora Float Committee, requesting donation towards expenses of float. From Hon. General Secretary, Australian and New Zealand Association for the Advancement of Science, requesting the appointment of delegates to the Sydney meeting. From the Director of Botanic Gardens, with reference to excursion. From Canterbury Museum, acknowledging copies of "The Australian Naturalist."

Treasurer's Statement.—The Hon. Treasurer, Mr. John Powell, tabled his monthly statement, which showed a credit balance of £11/12/10.

New Members.—Dr. E. C. Chisholm, Mr. R. D. Miller, Miss A. Ratcliffe, and Miss Nellie Taylor were unanimously elected members of the Society.

Announcement.—The President announced the death of Mr. A. M. Lea, Entomologist to the South Australian Museum. Members stood in silence as a mark of respect.

Exhibition of Specimens.—Mr. F. J. Ludowici: Egg-case of mantis.

Mr. M. E. Gray.—Fresh-water sponges and notes on their life-histories. Photograph of a larva of *Pinara*, sp. Specimens of *Ranatra australiensis*, the "water-scorpion," and notes on the effect of their bite.

Miss Peterson.—Hermit-crab obtained at La Perouse: fruit of Mexican black-walnut.

Mrs. S. A. Howell.—Seeds of *Myrsine variabilis*.

Miss D. Lawry.—Stalactite from cave on Polona Creek, National Park.

Mr. E. C. Bailey.—Specimen of *Datura strumarium*.

Mr. Luke Gallard.—Gall of *Apiomorpha fletcheri*, an ant lion, wasps bred from cup-moth, and a very beautiful newly-emerged specimen of swift moth, *Leto staceyi*.

APRIL, 1932.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, April 5, 1932, at 8 p.m.

The President (Mr. W. W. Froggatt), in the chair, with about 100 members and visitors present.

Lecture.—Mr. N. W. Cayley delivered a most interesting and instructive lecture on birds. He described the habits of those of the interior, as well as those of the coastal regions. The lecture was illustrated by a very fine series of lantern slides, the work of several well-known bird photographers. The lecturer was accorded a very hearty vote of thanks, which was carried by acclamation.

Correspondence.—Letter from Mrs. A. M. Lea, returning thanks for message of sympathy. From Hon. Secretary, Society for the Protection of Native Races, giving notice of annual meeting. From the Australian and New Zealand Society for the Advancement of Science re delegates for the Sydney meeting.

Letter from Mrs. G. G. Park re library matters, and conveying resignation of Mr. Park from the position of Hon. Librarian to the Society.

From Mr. R. A. Black, sending greetings to the Society.

Treasurer's Statement.—Mr. John Powell (Hon. Treasurer), tabled his monthly statement, which showed a credit balance of £12/11/8.

Nomination of Members.—Miss Lloyd-Owen. Proposed by Mr. W. W. Froggatt, seconded by Miss D. Dobbin.

Exhibition of Specimens.—Mrs. Black: Specimens of wild melon, common in western N.S.W., where they are known as "Paddy-melons."

Mrs. S. A. Howell.—Nests of the Bul-Bul and Silver-eye.

Mr. Weedon.—Stick insect, *Tropidoderus childreni*.

Master J. Ludowici.—Eggs of the Brolga and Blue Crane.

Miss Heyner.—Nests of the Flame-breasted Robin and Pipit.

Miss McCallow.—Nest of the Mistletoe bird.

Mr. W. W. Froggatt.—Skins of Birds of Paradise and Raquet-tailed Kingfisher, taken in New Guinea in 1885. Skin of crested pigeon from the Kimberley district, native head-dresses of Bird of Paradise, cassowary and cockatoo feathers.

Professor Abbott.—Collection of native flowers from the vicinity of Sydney.

Mr. Luke Gallard.—Lantern slides, showing the life-history of *Leto staceyi,* together with specimens showing method of setting.

MAY, 1932.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, May 3, 1932, at 7.45 p.m.

The President (Mr. W. W. Froggatt), in the chair, with about 60 members and visitors present.

Lecture.—Mr. W. Boardman (Assistant Zoologist, Australian Museum), delivered an extremely interesting and instructive lecture on "Sea-shore Life," illustrated with numerous coloured lantern slides. The lecturer dealt with the life on the sand, among the rocks, and on the mud-flats and mangroves. At the conclusion of his address, the lecturer was accorded a hearty vote of thanks.

Excursion.—Mr. A. E. Watson gave a brief account of the excursion to Engadine on the previous Saturday, and exhibited a specimen of *Banksia integrifolia.*

Mr. M. E. Gray.—Gave an account of various birds seen at Engadine.

Correspondence.—Letter from Miss Dorothy Murphy, inquiring re "Australian Naturalist." The Secretary, Public Library, Museum and Art Gallery, South Australia, re (1927) Journals. University of Washington Library, U.S.A., re Vol. 7, Part 1, "Australian Naturalist." Wisconsin Academy Science, re missing parts "Australian Naturalist." Science Museum, South Kensington, London, asking for "South Australian Naturalist." Mr. D. Dickison, St. Kilda, Victoria, re "Australian Naturalist." Letter from Mr. Keith C. McKeown, resigning from the position of Hon. Secretary to the Society.

New Members.—Miss Lloyd-Owen was unanimously elected a member of the Society.

Nomination of Members.—Miss Phyllis Burnett, 777 Railway Parade, Allawah. Proposed by Mrs. A. E. Watson, seconded by Mr. W. W. Froggatt. Mr. E. C. Bailey, Monash Parade, Croydon, N.S.W. Proposed by Mr. G. White, seconded by Mr. W. W. Froggatt.

Exhibition of Specimens.—Mrs. S. A. Howell: Specimens of red and white coral.

Mr. Luke Gallard.—A collection of aphids.

Mr. Barnard.—Specimens of the "Bird flower," *Crotalaria laburnifolia.*

Mr. John Powell.—Shell of a Brazil nut, like a small coconut shell, in which all the nuts are packed.

JUNE, 1932.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, June 7, 1932, at 7.45 p.m.

The President (Mr. W. W. Froggatt), in the chair, with about 50 members and visitors present.

Lecture.—Mr. Ernest Bryce delivered a most interesting lantern lecture on a "Trip Through the Caucasus." At the conclusion of his address, which was thoroughly enjoyed by the members, a hearty vote of thanks was accorded to the lecturer.

Excursion.—Mr. W. W. Froggatt gave a short account of the excursion to Northbridge.

Correspondence.—Mrs. Park, re library. Mr. M. E. Gray re change of address to Katoomba.

Treasurer's Statement.—Mr. John Powell tabled his monthly statement, which showed a credit balance of £19/8/2.

New Members.—Miss Phyllis Burnett and Mr. E. P. Bailey were unanimously elected members of the Society.

Nomination of Members.—Mrs. J. Fraser, c/o 350 George Street, Sydney. Nominated by Miss Nora White, seconded by Miss D. Dobbin. Mrs. A. B. Cooke, 15 Bundarra Road, Woollahra. Mr. L. A. Gray, 15 Bundarra Road, Woollahra.

Resignations.—Miss Heather Drummond, Mrs. L. A. Heyner, Miss E. B. Button, Miss Margery Tarrant, Miss Agnes Brewster, Miss Hilder Bocklen, Mr. A. W. Duncan, Mr. John E. Lee, and Mr. M. M. Lumsdaine.

Exhibition of Specimens.—Miss H. McAnene: "Bird of Paradise fly" (*Coccidae*).

Mr. A. E. Watson.—Specimen of prickly pear, showing the work of the caterpillar, *Cactoblastis cactorum.* Specimens of *Acacia* spp., *Callitris mulleri*, *Casuarina glauca, Melaleuca* and lichens from the Inverell district.

Professor A. J. Abbott.—A South African plant, and native flowers, amongst which were Banksias, Acacias, Epacrids, Crowea, etc.

Mr. W. W. Froggatt.—Specimens of *Angophora clelandi* and a number of galls.

Protest.—Mrs. S. A. Howell mentioned the destruction of trees at National Park, and suggested that a letter be sent to the trustees. Mr. D. G. Stead also spoke of the destruction of the trees in Rawson Avenue, National Park, and said that over 90 trees had been removed. It was decided that the trustees be written to.

Obituary.—The President drew the attention of members to the recent death of the Hon. Librarian, Mr. G. G. Park, and members stood in silence as a mark of respect to their late fellow-member.

JULY, 1932.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, July 5, 1932, at 7.45 p.m.

The President (Mr. W. W. Froggatt), in the chair, with about 40 members and visitors present.

Members' Night.—Mr. John Powell: Specimen of shale from Newnes; also specimen from near Edinburgh, Scotland. Mr. Powell described his visit made to Newnes in December, 1931, and spoke of the works and machinery which cost £1,500,000 to instal.

Miss Thistle Y. Harris.—Specimens of *Epacris longiflora,*—one of the usual form, and the other a white example, gathered at Vaucluse. Flowers of *Cobaea scandens,* showing the different stages of pollination. Tree trunk, showing horse-shoe embedded therein. Specimen of *Stenocarpus salignus* (wheel-tree).

Mrs. Jenkins.—Specimen of Queensland chestnut.

Miss Peterson.—Specimen of Chinese lily.

Mr. A. E. Watson.—Specimen of "paddy-melon," *Cucumis myriocarpus,* and Noogoora burr, *Xanthium strumarium.*

Mrs. Spong.—Specimens of winged seeds from Port Darwin.

Mr. Luke Gallard.—Twig, showing where eggs of a cicada had been laid, and eggs of the passion vine froghopper.

Professor A. J. Abbott.—Native flowers collected in the Long Bay district.

Mr. W. W. Froggatt.—Two mantis egg-cases on the same twig.

Mr. P. E. B. Barnett.—Showed a number of interesting lantern slides of various spiders and their habitations, and explained some of their habits.

Mrs. S. A. Howell.—Exhibited a very fine collection of lantern slides of the Koala (Native Bear). Mrs. Howell described their life and habits amongst the trees and when on the ground, and stated that they had been almost exterminated through wanton destruction.

Excursion.—Mr. W. W. Froggatt made reference to the excursion to Ball's Head on Saturday, July 2, where members examined the trees planted in July last year. Some of the trees were growing well, but about 40 had died. The President proposed to write to the North Shore Council and suggest that the Society would re-plant trees in place of those that had died.

Correspondence.—Letter from Mrs. Park, returning thanks for letter of sympathy. Letter from National Park Trustees acknowledging letter of protest from Society.

The President reported that he had been in correspondence with the Trustees of the National Park Reserve, in connection with the destruction of trees in National Park, and also that he had visited the Park and examined the trees still standing in Rawson Avenue.

The President said that the majority of the trees (*Pinus insignus*) should come out as they were dying. He also reported having advised the Trustees to plant *Angophora lanceolata* which grows so well in that locality.

Treasurer's Statement.—The Hon. Treasurer (Mr. John Powell), tabled his monthly statement, which showed a credit balance of £22/0/2.

New Members.—Mrs. J. Fraser, Mr. A. B. Cooke and Mr. L. A. Gray were unanimously elected members of the Society.

Nomination of Members.—Mr. W. E. Williams, c/o T. Williams & Co., Cootamundra.

ON GUARD.

A pair of wasps, *Pison spinolae,* discovered a small hole in the side of a case at my rectory, Portland, N.S.W. In taking observations of their movements I noticed they both occasionally entered the hole together, and, on exit the male flew off, leaving the female on guard at the entrance; faithful to her trust, if any marauder in the form of another wasp, even of the same species, or fly ventured near, she hunted it away, chasing and attacking it in mid-air. This continued for a few days, but I failed to find any sign of nest-building inside the case.—F. E. Haviland.

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RECOLLECTIONS OF OLD SYDNEY BUSHLANDS.

By Walter W. Froggatt.

(Presidential Address, given at Annual Meeting of the Naturalists' Society of New South Wales, August 2, 1932.)

While looking through my old note-books, I have come across references and notes made over forty years ago. These notes are on insects, observed or captured in the suburbs of Sydney, in places which were then bushland, but which are now suburbs, laid out with concrete roads, rows of villas, and with shopping centres.

There is now not a vestige of the original flora or fauna, which, not so very long ago, was growing there and living in all its glory.

In those days, Mr. J. J. Fletcher, Mr. F. A. A. Skuse and I were on the staff of Sir William Macleay's Museum at Elizabeth Bay.

We used to ramble and collect specimens on the hills, valleys and scrublands surrounding Sydney Cove. Sometimes our excursions extended to Waterfall, National Park; we then travelled by train from Sydney in the early morning to Waterfall, and walked back to Sutherland. We were a hiking party, with a definite object in view, and studied plants, trees, birds, and insects.

To give some idea of the lovable nature of my old friend, the late Mr. J. J. Fletcher, one of our first field naturalists: We had reached the river at Waterfall, and there found a pool full of large tadpoles at their last gasp, in only a few inches of water. Fletcher said: "We cannot let these little beggars die." So we put them in our billy-can and carried them down to the deep waterholes below;

it was a stiff climb down and up and necessitated several journeys. We went on our way, somewhat warm, but happy that we had done a kind deed, that hot summer's morning.

No one can realise the wonderful growth of the City of Sydney and suburbs better than some of the members of the original Field Naturalists' Society, which was founded 43 years ago.

When I first started collecting insects in the neighbourhood of Sydney there was hardly any North Shore, excepting Milson's Point and the foreshores. Here and there were patches of houses, but the rest was bushland. There were some fine old-fashioned homes, usually surrounded by old-time gardens; but there were no streets as at present. The builder of the modern villa had not then invaded North Shore.

Mosman was merely a wharf of call, where there was an old refreshment room, about a hundred yards along the road, with the old stone store house nearby, reminiscent of the old whaling days, when Mosman had a depot. Through all the years this solidly built store has stood, and was recently renovated and taken over by the Boy Scouts.

The road leading up the hill, along the side of the valley, was of very primitive construction, and visitors to the few houses on the rise were furnished with a lantern by their host after nightfall to light their way back to the ferry. The valley was full of scrub and gum trees, and a little waterfall ran down to the Bay, while at the head of the valley was the old stone house of the Ranger's Estate. Among the damp rocks Skuse and I collected many mosquitoes, tipulid and other flies, and some of these were figured and described by him in his Monograph of the Diptera of Australia, which was published in the Proceedings of the Linnean Society of New South Wales. This is still the standard work on these groups of flies.

On the top of the rise there was a large area of open land covered with the large *Angophora,* stunted *Eucalyptus, Leptospermum, Melaleuca,* and *Kunzea* bushes, while the underbrush was low scrub. Here we took sawfly and moth larvae upon the *Leptospermum* and young gum trees. We saw no houses till we came to Sneddon's Hotel, at the corner of Military Road and a road leading to the Spit. We would cross the Military Road and keep to the right of the Spit Road, where there was a large area covered with the dwarf Angophora. *A. cordifolia,* which, in early summer, was covered with bunches of large white honey-bearing flowers, on which swarmed many species of flower beetles, buprestids, cetonids, cockchafers, and longicorns, together with various flies and wasps.

In those days, this was one of the best patches of *Angophora* handy to Sydney, and on this hunting ground Skuse and I collected many fine insects.

There were also numbers of grass-trees, *Xanthorrhoea,* growing on the sandy soil, and here I first found the large, handsome grass-tree weevil, *Trigonotarsus rugosus,* and its plump legless larva in the dead butt of one of these trees. We kept several of these beetles alive in the Macleay Museum for some time, and Skuse found that if one were placed on its back it could not turn over, but folded its legs together, then, when touched with the finger, it opened its legs, clung with the stout sharp spines on its thighs, and was very difficult to dislodge.

Skuse, who was a bit of a wag, used to ask visitors to the laboratory to touch the beetle, already put on its back, to see the visitor catch a tartar.

We also bred out the brown chafer, *Micropoecila cincta,* from the grass tree; and several species of fine Diptera, from larvae in the decaying tissue. It was good collecting ground right down to the Spit, between the road and Chinaman's Beach, and it was here that I captured, resting on a burnt stump, a perfect specimen of that rare Heteromerous beetle, *Chartopteryx childreni,* with its deeply punctured, shining black, wingcovers, and sides ornamented with tufts of dull yellow moss-like filaments.

We usually went straight on, crossing the Spit in the ferry, and skirting the scrub along the road to Manly, thence by boat to Sydney.

Nearer home, the valley running back from Double Bay was overgrown with indigenous trees and shrubs, and this, with the slopes of Bellevue Hill, was another fine hunting ground for insects.

A large area of the hill was included in the Cooper Estate, and this was composed of a number of Government land grants to the soldiers, when they retired from the Old Rum Corps, which were bought up by Sir Daniel Cooper's father. All that remains of the indigenous flora is to be found on Cooper Park, on the Rose Bay side of the hill, and this is shorn of all the large trees.

There were very large tall grass trees, probably over a hundred years old, but none of these are left. It was a great place for Christmas Bush, which was in full bloom in December. Cooper's agents used to engage some of the aborigines from La Perouse to patrol the area with a couple of caretakers to keep out the flower pickers.

Living in Paddington at this time, I often used to go out collecting in the early morning, and several times came across a gang of the flower stealers, with loads of Christmas Bush, which they had gathered at dawn, resting outside the Cooper Estate before going on to the markets.

Cooper's guards held me up several times, until they realised that I was not interfering with the Christmas Bush.

My first records of many interesting insects were made in this area. Here I first found the curious hooked pupae of the mistletoe butterfly, *Delias harpalyce,* hanging on their web, spun over the foodplant, *Loranthus,* and first collected Brachyscelid galls, which puzzled me greatly, until I looked up Schrader's description of them, written some twenty years before, from specimens I believe he collected somewhere in this locality.

Here there were many beetles—The Botany Bay Diamond beetle, *Chrysolophus spectabilis,* was seen laying eggs in the butt of the stem of *Acacia discolor.* One day I found a slender brown longicorn pupating in the hollowed-out stem of a little shrub, *Lasiopetalum ferrugineum;* and this turned out to be a new *Uracanthus,* which, when I sent it to Blackburn, he named it after me.

Fletcher, Skuse and I sometimes had an afternoon away from the Museum at Elizabeth Bay, and walked across the hills to Rose Bay; Fletcher specialised on frogs and earthworms, Skuse on flies and mosquitoes, while I hunted for beetles, wasps and galls.

On the rise of Old South Head at Rose Bay there was a big clump of large *Melaleuca,* on the right-hand side. After a wind storm, several times we found specimens of the large brown leaf insect, *Acrophylla titon,* crawling on the ground. All these trees have long since disappeared, and in their stead are cultivated gardens.

There was no sea wall round Rose Bay in those days, but a fringe of sedge and a few *Banksias* marked the high water line. On the landward side was a thick fringe of long leaved wattles, *Acacia longfolia.* The swampy land behind them had been drained and partly reclaimed by the Chinese gardeners, and beyond this stretched the sands to the village of Bondi. The wattle trees were attacked by many longicorn beetles, and it was here that I first commenced cutting out the infested branches to breed out the perfect beetles. One of the first bred out was the handsome brown "Feather-horned" longicorn, *Piesarthrius marginellus,* and I also obtained a large series of the Evanid wasp parasite, *Aulacus apicalis,* of this beetle. The wasp larvae eat the beetle grubs and then spin their parchment-like cocoons, matted together, in the cavity.

Upon the trunks of the old Banksia trees were to be found specimens of the large handsome silvery-brown longicorn, *Pachydissus sericus,* whose larva also feeds in the stems of *Acacia longfolia.*

We sometimes spent the day at Botany, taking the tram through Waterloo to the terminus at the tanneries. The best of this bush has vanished; then it was a wilderness right across to La Perouse.

The latter is a historic spot, for it was about there that Banks and Solander collected the first insects in New Holland, probably the identical specimens that Donovan figured in his book, "Insects of New Holland," published in 1805.

The flowering ti-tree was very attractive to the flower wasps, *Thynnidae,* and many years afterwards, a number of these, collected at Botany, were described and named by Roland Turner, of the British Museum, in his Monograph of the Australian *Thynnidae,* published in the Proceedings of the Linnean Society of New South Wales.

There were many grass trees in flower which attracted bees, wasps, and flies, particularly the brightly tinted yellow and blue sawflies, *Pterygophorus,* sp., and the dry flower stems were hollowed out by the green carpenter bees, *Lestis bombylans,* to form their nests. A large longicorn beetle, *Symphyletes solandri,* cut these stems off, a foot above the base, and pupated in the chamber after plugging up the opening.

Two other fine species of the same genus ringbark the stems of the long-leaved wattles before they deposit their eggs in the little horseshoe scars they cut in the bark beneath. These were both greyhaired beetles, *S. neglectus,* and *S. albocinctus.*

Another interesting find was the clusters of oval galls of the two small buprestid beetles, *Ethon corpulentum,* and another species of *Ethon* on the roots of a small shrub, *Dillwynia ericifolia.*

To-day, we field naturalists have to go farther afield to get our specimens. With the inevitable destruction of their foodplants, many insects, once plentiful, are now very rare, and possibly may become extinct.

The only remedy is for us to advocate and assist in the regeneration of areas in and about Sydney, which can be secured by Municipal Councils or private persons, on which to renew the original indigenous flora, and so bring back the birds and insects to their nesting homes and food.

This, we hope, to see in a few years exemplified at Ball's Head, with the growth of trees and flowers on that bold headland.

It is most essential that our parks, sanctuaries, and public gardens be protected from encroachment and from spoilation.

We must unite, and prove to those in power what great benefit will accrue, if practical botanists and scientific naturalists are appointed on these Boards of Trustees. The more men we have of this type, on the Boards, the more hope we have of preserving our reservations intact, and in their virgin beauty.

After the builder (and he is a stern necessity) the greatest enemy our bushland has, is the neglected fire of a careless camper. It can do more harm in a few hours than all the flower pickers can do in a year.

New South Wales, however, is not alone in the matter of losing the natural beauty surrounding its towns. Many of the towns of England are suffering from the same changing conditions.

The same necessary extension of suburbs on the outskirts of London has invaded many well known beauty spots. The linking up of villages and small towns by a network of new motor roads has led to clouds of fine dust, which affect the fringing vegetation.

The nature lovers of England are trying to counteract these changes, and are saving some of the beauty spots by purchasing waste lands, and enclosing them from outside intrusion. They hope to reintroduce the original flora by regeneration and by judicious planting.

Wickham Fen, an area of 200 acres, has been enclosed and protected for some years. The members of the Royal Society for the Protection of Birds have just collected £4.000 for the purchase of Romney Marsh, as a sanctuary for the British waterfowl for all time.

Speaking of nature lovers protesting against the construction of new motor roads and so spoiling the charm and beauty of Rural England, Hackling, in his "Story of the Roads," says: "The lovers of beauty would do better to save their protests against destruction and endeavour to devote their energies to influencing construction. If the old beauty cannot be saved, a new beauty can be created. To praise the past is not enough; it is necessary also to make the future praise the present."

FRESH WATER SPONGES.

By M. E. Gray.

Some two years ago, Mr. Norris and I introduced into our aquaria, what we then thought to be a new variety of aquatic plant. Our specimens were taken from Kangaroo Creek, National Park, and were green in colour. They had a most peculiar odour, that even now we cannot define, except to say that it "smells of the sea."

The specimens were not a success as aquarium plants, as they just faded away and disappeared.

Some months later, a chance remark, by Mr. A. A. Livingstone, of the Australian Museum staff, gave me a clue as to the identity of our specimens, and set us both on a long search in many streams and localities for about nine months, when a very small specimen was secured from the Hacking River at Lilyvale, where the stream is known locally as "The Creek." Mr. Livingstone identified the specimen as a fresh water sponge.

From then on our search was intensified, and we secured quite a number of specimens, mostly small, in various portions of Heathcote Creek, and in the Woronora River below its confluence with the former stream.

During 1925, Mr. Livingstone secured specimens of fresh water sponges from a colony anchored to a large boulder in the Woronora River. These specimens were submitted to Dr. N. Gist-Gee, of the Rockefeller Foundation, Peiping, China, who has tentatively placed them with *Ephydatia fluviatilis* auct., pending the examination of gemmule,, bearing specimens from the same locality. *

Until Mr. Norris and I took up the search, as far as I have been able to ascertain, these specimens are the only known ones to have been collected around the Sydney district during the last fifteen or twenty years.

We endeavoured to secure specimens bearing gemmules in order to determine definitely their genus and possibly species.

We did not collect all the specimens encountered, but always left a percentage as "check specimens," so that we could record their growth and development, if possible. Unfortunately we have not been able to do this, as storm waters have invariably washed our specimens away.

The creek at Lilyvale eventually proved to be our best field. Over a stretch of some 300 yards on our last visit there we were able to locate many colonies in various stages of development. The specimens varied in size, from an eighth of an inch in diameter up to a colony covering about an area of 2 square feet. The smaller colonies were identical with those found in the other streams. In shape they vary from almost circular to ovate, and are more or less conical; they vary in colour, some being cream, some straw-coloured, the majority being lettuce green. As a rule they grow as an encrustated mat of green, with an irregular surface. The larger colonies in Lilyvale Creek were "stalked"—that is, covered with antlered branches, some of which measured two inches in length. We noticed that these fingers were jutting out into the current, directed up stream, and although quite fragile they were able to withstand the force of the stream without apparent strain, but when pressed between finger and thumb they are inclined to be soft and crumbly. They are to be found in pot-holes, rapids and pools, but have never been observed at a greater depth than 2 feet, nor less than 2 inches below the surface, and, although suitable timber has been available, we have never observed them on any anchorage other than sandstone. They have been observed on small stones, weighing 3 or 4 ounces, and attached to anchorages that were the bases of cliffs, set in the stream, and weighing many tons.

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* Dr. N. Gist-Gee has since stated that they are a species new to science and has named them *Spongilla multispinifera*.

The colour variations are probably due to the effects of sunlight, for so far we have not observed a single specimen of a cream or straw colour on the top or side of an anchorage, but, on the other hand, we have frequently observed both cream and green coloured specimens on the underside of the same rock. From our observations we are inclined to think that individual sponges grow as encrustations, with irregular elevations and depressions, until they meet with the edges of other specimens, when they merge and develop into the stalked or antlered forms, but this has yet to be proved.

Mr. Livingstone obtained his specimens during December, but we have found only very small specimens during that month, and apparently gradually increasing in size up to May, when our largest colonies were located. During the winter months, and frequently during February, these streams are subjected to floods, when they become raging torrents that carry down tons of rocks and timber, which, no doubt, tears most of the sponges from their anchorages and so destroys them. They are very fragile animals, and the flesh breaks down rapidly once they are scraped from their anchorages or removed from the water. Prospective sponge collectors are advised to have a spirit bottle ready to place them into immediately they are secured.

All specimens collected should be submitted to the Australian Museum as soon after collection as possible, together with the date and place of collection, etc., as little is known concerning Australian fresh water sponges.

[A Recollection.—It will probably be of interest to members to note, that on an excursion to Heathcote on Saturday, July 7, 1917, fresh water sponges were collected and shown to members by Mr. F. W. Carpenter, M.A. (the leader), who advised how to prepare the spicules for microscopic examination.—Editor.]

AN INTERESTING BIRD HABIT.

By Arthur F. Norris.

Just before sunset on May 7, 1932, the author, accompanied by Mr. M. E. Gray, had the enviable experience of witnessing the ablutions of a flock of birds in a tiny pool, measuring about five feet by three, and only two feet in depth, which was three-parts surrounded by banksias.

We had remained on Engadine Creek, after the departure of several of our fellow naturalists, who had been engaged in exploring the nearby district, and were discussing the scarcity of birds in that area.

Our party, in several hours, had disturbed less than fifteen of our feathered friends.

While we spoke, we were suddenly interrupted by the querulous scolding of a Leather-head, *Philemon, citreogularis,* and its mate.

It was getting late, as we intruded on the scene, but, as we remained silent, and motionless, their cries stopped, and presently several little Honeyeaters fluttered into the banksias.

These were followed by more of a different variety, some Southern Yellow Robins, *Eopsaltria australis,* a pair of Grey-Breasted Silver-Eyes, *Zosterops lateralis,* and more Honeyeaters.

In a few minutes the banksia branches were weighed almost to the surface of the water, and the mingled twittering and whistling rose in a beautiful chorus.

Suddenly, one of the bolder Robins flew into the water and fluttered its wings furiously, splashing water in all directions.

This seemed to be a signal, for he was followed by a number of other birds, some timidly splashing on the shallow edges, and others, vigorously spluttering in the middle, dipping their heads under with great gusto.

Having finished its bath, a bedraggled little creature would fly to the lowest branches of a nearby gum, and preen itself very prettily.

A plummet seemed to drop from the sky in one bird, for it flew almost perpendicularly into the water with a loud splash, descending several inches beneath the surface.

All this time, birds came from everywhere, and it was almost impossible to hear the distant laughter of our party, so loud was the intermingled sound of twittering, whistling, splashing, plopping, and the whirring of many wings. One might say he heard a divine orchestra.

The whole scene consisted of a continuous flight of birds; coming to, going from, and engaged in the water; preening on a crowded branch, or whirring excitedly over the pool.

This spectacular performance lasted twenty odd minutes, during which time it was estimated that nearly one hundred and fifty birds, of sixteen varieties, visited the pool for their nightly dip.

Where they came from is a mystery, but it may be explained by the fact that this particular spot is never dry (having a clay bottom, and being near a spring), and, knowing this, the birds may come from a considerable distance to engage in this rite.

After they were quite dry they flirted about in the tree-tops for a while, and then gradually disappeared in ones, twos, and threes.

We found a human touch in the arrival of some latecomers—two Red-Capped Robins, *Petroica goodenovii,* who were more interested in us than the water, and a solitary Echong or Rufous Whistler, *Pachycephala rufiventris.*

I had the good fortune to coax this bird to within a yard of me, by mimicry, when, to its entire disgust, it discovered it was deceived.

It even left without its dip.

Then darkness settled over all, and the bush was suddenly hushed.

The following is a list of the birds noticed:—White-eared Flycatcher, *Carterornis leucotis;* Southern Yellow Robin, *Eopsaltria australis;* Red-capped Robin, *Petroica goodenovii;* Rufous Whistler, *Pachycephala rufiventris*; Banded Finch, *Steganopleura bichenovii;* Red-browed Finch, *Aegintha temporalis;* Grey-breasted Silver-Eye, *Zosterops lateralis;* Leather-head, *Philemon citreogularis;*

Yellow-faced Honeyeater, *Meliphaga chrysops;* Singing Honeyeater, *Meliphaga virescens;* White-plumed Honeyeater, *Meliphaga penicillata;* Yellow-tufted Honeyeater, *Meliphaga melanops;* Eastern Spinebill, *Acanthorhynchus tenuirostris;* White-naped Honeyeater, *Melithreptus lunatus;* White-bearded Honeyeater, *Meliornis novae-hollandiae;* Little Thornbill, *Acanthiza nana.*

A SEARCH FOR FRESH WATER SPONGES IN THE COX RIVER.

By M. E. GRAY.

At 2.35 p.m. on Thursday, June 16, 1932, Ben Esgate (a sturdy Australian youth with a knowledge of bushcraft that many an older bushman might well envy), and I set out from Katoomba, en route, via the old "Bonnie Doon" track, for the Cox River. Sydneysiders at this time were suffering from the effects of intense cold, while vagrant flakes of snow mingled with the showers of sleet that swept over Katoomba.

The object of my journey was to search the river and some of its tributaries for fresh water sponges. "Bonnie Doon" is a neglected track, and in wet weather must be negotiated with care, as it is in a dangerous condition; it ends on the "Nellie's Glen" track, which becomes the "six foot" track leading to Jenolan Caves. We kept to the "six foot" until we reached "The Pinnacles" gate, through which we passed, then turned northwards, and, after traversing the steep side of a hill through open timber, we crossed Megalong Creek, about a quarter of a mile above its junction with the Cox River. Then, after clambering up the almost precipitous hill on the other side, we were soon descending an equally precipitous hillside on to the Cox River, which we crossed by granite boulders of various shapes and sizes, about 300 yards or so from its confluence with Megalong Creek. Here was our camp site. Our progress through Megalong Valley had been fairly rapid, and I would gladly have doffed top-coat and coat soon after passing through "Nellie's Glen." We arrived at our destination at 5.30 p.m., and slid our rifles and packs from our shoulders. The sun had set and the full moon was well up, which was rather fortunate, as otherwise we would have had some difficulty in collecting firewood. Ben chopped a number of red gum logs, which we hauled to our camp site, as they burn slowly and with great heat. Our cave was formed by a huge granite boulder, which chance had perched at a crazy angle, on two smaller boulders, and the floor was covered with coarse sand. Our cave measured about 14 feet in width with a depth of 8 or 10 feet, and in height some 6 feet in front, diminishing to about 10 inches at the rear. To right and left were large river oaks that spread their branches over our shelter. The sheer cliff face of "Billy Heely" rose abruptly, about 12 yards in front, while the intervening space was strewn with granite boulders among patches of sand. Behind us the river bowled boisterously along, while a few yards up stream was a small fall, where the water pounded noisily, and a few feet below gurgled and splashed past the boulders that we crossed by. Here was a scene of transcendent beauty, which, later in the evening, after a light shower of rain, and with the moon almost directly overhead, became indescribably beautiful, as every boulder and grain of sand glittered and gleamed beneath the moon's refulgent rays. Friday morning saw me early afield. I made a survey of the adjacent pot-holes, as well as the river and portion of Pulpit Hill creek. The only aquatic plant observed in the river itself was a *Myriophyllum,* but in various pot-holes *Ceratopetallum,* sometimes overgrown with *Nitella,* was seen. No sponges were seen, so on Saturday I worked down stream and up Megalong Creek. The junction of these two streams was rather unique, as a dyke-like spur of red granite jutted out from "The Pinnacles" into the intersection of both streams. The right-hand bank of the Cox was there composed of red granite, and a number of pinnacled boulders were strewn along the side; about a hundred yards up stream was a low fall, where the water rushed with terrific force into a partially rounded red granite basin. At the mouth of the Megalong Creek was a grey granite rock-bound pool of great depth, while a few hundred yards up stream was one of the most beautiful series of cascades that I have ever seen, but again my search for sponges was unsuccessful. The aquatic plant-life in Megalong Creek was identical with that of the former day's search. From our "cave" we moved down stream to the mouth of "Pinnacles Creek." The trip down was particularly arduous, as the soles and heels of my boots had worn down to the nail heads, while the smooth granite, in parts, was very steep and slippery. We only arrived at our destination after many thrilling escapes from disaster. Sponges were absent in "Pinnacles' Creek," but here I saw my first "Mountain Daisies." That night we slept with the sky for our roof, and twice during the night I was awakened by raindrops, cold as needles of ice, falling on my face. In Katoomba there was a moderate fall of snow. From "Pinnacles Creek" we trekked over the "Pinnacles," to "Black Jerry." "Three-boulders Camp" on "Black Jerry" is rather interesting, as it is an out-crop of boulders, three of them being placed one on top of the other as if by the hands of some giant. "Black Jerry" Creek also proved to be devoid of sponges, the plant life was similar to the other streams searched. After leaving "Black Jerry" at 3 p.m. on Monday, June 20, we set out for home, across country. I made hurried searches at some five or six small streams, tributary to Megalong Creek, that we crossed, but all proved negative. The animals observed during the trek included wallaroos, scrub wallabies, ring-tailed opossums, rabbits, and one fox, which Ben shot. I noticed some twenty varieties of birds, the most numerous of which were the Lowries, Lyre-birds, which were numerous, Kurrawongs, Crows, Yellow Robins, Robins, Thornbills, Tree-creepers, orange-winged Sittellas, Diamond sparrows, Blue wrens and Cormorants. In a few of the pot-holes I observed two species of water-beetles, and a number of water snails and several "water-striders" that were much smaller than any I had seen previously. Under a rock, at our first camp, I secured a pair of beetles, and I saw several dead specimens of *Anoplognathus*. Blow-flies were always present, but not in sufficient numbers to worry us, as we secured our meat fresh daily. On all the dry hillsides empty pupal cases of moths, some of them five to six inches long, were to be observed in great numbers, partly protruding out of holes in the ground, not unlike so many cray-fish in their burrows. Many of these pupal cases contained a vile smelling fluid of a light brown colour. A small tube of dead midge-flies was also collected from the side of a granite boulder, in the Cox, where they were attached by fine gossamer-like threads. In many of the pot-holes were found numbers of tadpoles that had been frozen to death. All the pools were ice-covered each morning, the ice often remaining there until after mid-day.

Although I failed to locate any sponges, I am delighted to have made the trip, as it was all new country to me, and every minute was interesting. I could tell much more of camp life incidents, but space forbids. In conclusion, I may mention that it is my intention, if circumstances permit later in the year, to visit the Kowmung, and possibly the intervening streams, although I am not sanguine of finding sponges in any but sandstone country.

MARINE ZOOGEOGRAPHICAL REGIONS OF AUSTRALASIA.

By Gilbert P. Whitley.

Anyone who has studied Australian shells, crabs, fishes, or other marine creatures, soon realises that these animals are not uniformly distributed throughout our seas, but restricted to certain areas, governed by fairly definite conditions of environment, temperature, etc. To detail these would involve a considerable incursion into the science of ecology, which our present knowledge of the faunas hardly permits, especially in a short article. However, we all know that tropical shells, corals, and fishes do not occur in Tasmania, for instance, and that the Blue Cod of New Zealand does not live in Australia, and cases such as these could be multiplied by the hundred.

The creatures of our seas are practically confined to definite marine provinces, shown on the accompanying map, which is based on the researches of many eminent marine zoologists.* The recognition of these provinces is of more importance to the study of our sea faunas than the political State boundaries usually employed.

The name Banksian Province is now provided for the coastal districts of Queensland, which possess a marine fauna quite distinct from that of the Great Barrier Reef, for which the name Solanderian, proposed by the famous conchologist, Charles Hedley, may be retained.

The New Caledonian Province may be called Montrouzierian, after the great missionary, Rev. Père Xavier Montrouzier, and restricted to New Caledonia and the Loyalty Islands, which have faunal elements, distinct from those of the New Hebrides, and, in a few cases, apparently related to some Eastern Australian and Lord Howe Island elements.

The other provinces shown are well marked, and have been named before, but this is the first time that a map including them all has been published, and this, it is hoped, will prove useful to those interested in marine zoology.

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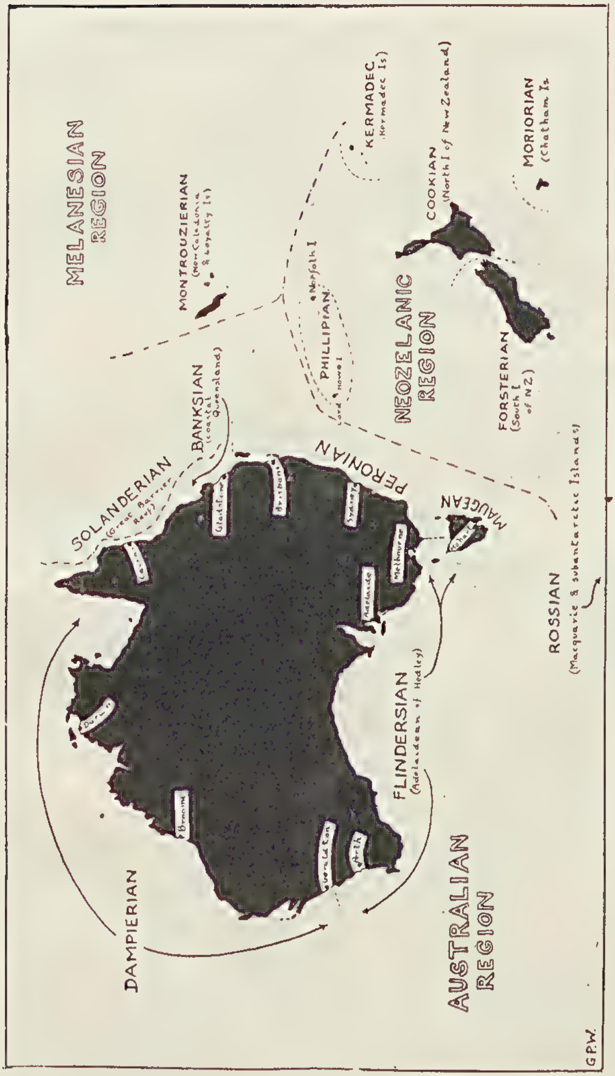
* Hedley, Proc. Linn. Soc. N.S. Wales, xxviii., 1903 (1904), p. 880; Hull, Emu, xi., 1911, p. 60; Iredale & May, Proc. Malac. Soc. Lond., xii., 1916, p. 117; Finlay, Gedenboek Verbeek, 1925, p. 168, and Trans. N.Z. Inst., lvii., 1926, p. 328; Iredale & Hull, Austr. Zoologist, v., 1929, p. 311; and Cotton, Rec. S. Austr. Mus., iv., 1930, p. 219.


MELANESIAN REGION
MONTROUZIERIAN (New Caledonia & Loyalty Is)
KERMADEC (Kermadec Is)
COOKIAN (North I of New Zealand)
MORIORIAN (Chatham Is)
Norfolk I
PHILLIPIAN
Lord Howe I
NEOZELANIC REGION
FORSTERIAN (South I of NZ)
BANKSIAN (coastal Queensland)
SOLANDERIAN (Great Barrier Reef)
PERONIAN
MAUGEAN
Hobart
ROSSIAN (Macquarie & subantarctic Islands)
FLINDERSIAN (Adelaidean of Hedley)
AUSTRALIAN REGION
DAMPIERIAN
Cairns
Gladstone
Brisbane
Sydney
Melbourne
Adelaide
Darwin
Broome
Geraldton
Perth
G.P.W.

A MARINE ZOOLOGY MAP. See article opposite.

NOTES ON THE FEEDING HABITS OF THE BROWN MOTH-LACEWING, *ITHONE FUSCA.*

By Luke Gallard.

During early work in connection with *Ithone fusca,* the larvae were fed on "white curl grubs" (Scarabaeid larvae), the heads of which had been pinched to prevent them from biting, and on several occasions they were noticed to be sucking freely of their body juices.

The locality in which *Ithone* larvae were found, the prevalence of small Melolonthid beetle larvae, and the general similarity in form of these, so marked that in the first place one was mistaken for the other, coupled with the general habits of the Neuropteron, seemed to indicate that probably "white curl grubs" were the main food of *Ithone.*

Dr. R. J. Tillyard, with whom I was working at the time, and to whom I am indebted for the information, made a careful dissection of the larva. and considered that by the formation of the gut they were carnivorous.

Knowing the voracious habits of most of the Neuroptera, and never having seen an *Ithone* larva attack a live "curl grub," I decided to carry out further investigations.

One large "curl grub" and one large *Ithone* larva placed together in a glass tube roamed about for over an hour, but the *Ithone* larva made no attempt to attack the "curl grub." The following morning the "curl grub" was alive, but the *Ithone* larva was dead. This experiment was repeated several times, the results being similar. Smaller "curl grubs" were next offered as food, until some not one-third of an inch in length were used, but in no instance did *Ithone* attack them.

Thinking that perhaps *Ithone* had not had a chance to adopt its own method of attack, quart jars containing about 6 inches of loose earth were used in 20 tests, the results being that sometimes the *Ithone* larva would be dead, sometimes the "curl grub." In all cases where the larva of *Ithone* fed upon the body fluids of the "curl grub" it died within two months, and if it feed freely, within a few days.

Other insect larvae, including cutworms, codlin moths, Mydaid flies, Asilid flies, and Tenebrionids were also offered as food. At night the *Ithone* larvae were seen to crawl frequently, over quite small "curl grubs," without attempting to attack them.

On February 7, 1931, while digging for the larvae of *Ithone,* at Epping, I found a large root of a "Red Gum," *Angophora lanceolata*, which was surrounded with decaying bark, and on following this along *Ithone* larvae were noticed in close proximity to the bark, and on a later occasion the same observations were made. This suggested, that perhaps the larvae were feeding, either on the decaying bark, or on some small organisms associated with it.

From May, 1931, larvae of *Ithone* were given decaying bark, small Homoptera, and wood lice, or slaters found in the soil; other larvae were placed in small glass tubes with decaying *Angophora* bark (only) which was moistened from time to time. The larvae worked their mandibles along the surface of the bark, nipping off small pieces, and dropping them, until some of the tubes were almost half-ful of debris. They appeared to extract the sap and cast the residue aside, and where I placed both earth and bark into larger receptacles with the larvae of *Ithone* they "chafed" the bark freely, and in several instances left definite corrugations in it. By this method the larvae were kept alive for from six to twelve months.

One larva placed in a jar with "slaters" or "wood lice" and small Homopterous insects lived for nine months.

Another larva placed in a tube with some medium-sized "mealy bugs" taken from the ground made no attempt to attack them.

An *Ithone* larva placed in earth in which no insect infestation was observed lived for nine months and ten days.

During my experiments of the last two years, ninety-three different groups of *Ithone* have been under close observation, and a summary of the notes gives the following conclusions:—

1.—That but little food is required to develop the larvae of *Ithone;* they develop slowly, sometimes entering into the third year.

2.—That their primary food is obtained by suction; water impregnated with solutions from decaying vegetable matter in the soil, or from decaying bark obtained by "chafing" the surface, and extracting the liquids, and probably the body fluids of small Homoptera, found in association with decaying bark in the soil.

3.—*Ithone* will not attack or kill "white curl grubs" for food, although they will feed upon the body fluids of "curl grubs" that have been cut or crushed. This food does not agree with them, and shortens their lives.

In early searches, one of the most successful hunting grounds was where decaying matter, etc., had been buried. Possibly the impregnated water around this place may have been the attraction.

Mr. V. Retford, of Woy Woy, who was associated with us in our early investigations, informs me that he has kept an *Ithone* larva alive for over four months in soil which had been previously thoroughly sterilised.

NATURALISTS' SOCIETY OF NEW SOUTH WALES.

Proceedings.

AUGUST, 1932.

The annual meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday,, August 2, 1932, at 7.45 p.m.

Mr. G. Ross-Thomas (Director of Education), in the chair, the President (Mr. W. W. Froggatt), with about 96 members and visitors present.

Apologies were received from Mr. S. C. Harkness, Department of Education, and Mr. A. S. Le Souef, Director of Taronga Park Zoological Gardens.

Presidential Address.—The President delivered a short address, entitled, "Recollections of Old Sydney Bushlands."

Lecturette.—An extremely interesting lecturette, illustrated with lantern slides, was delivered by Mr. David G. Stead, on "Crabs."

Election of office-bearers for the year 1932-1933.

The following were duly nominated and elected to office for the ensuing year:—

President: Mr. W. W. Froggatt.

Vice-Presidents: Messrs. David G. Stead, A. E. Watson, and Luke Gallard.

Hon. Secretary: Miss Dolce Dobbin.

Hon. Assistant Secretary: Miss Lillian Halloran.

Hon. Treasurer: Mr. John Powell.

Hon. Assistant Treasurer: Miss Kaylock.

Hon. Editor: Mr. E. H. Zeck.

Hon. Librarian:

Hon. Assistant Librarian: Mr. Richard Ankers.

Hon. Lanternists: Messrs. G. White and A. Booth.

Other Members of Council: Mrs. A. E. Watson, Misses H. McAnene, L. Steinbeck, Messrs. P. E. B. Barnett, E. Gostelow, J. W. Hawley, F. J. Ludowici, A. E. Tebbutt.

Publication Committee: The President, Hon. Editor, and Hon. Secretary.

Annual Report.—The Hon. Secretary (Miss Dolce Dobbin) read the annual report upon the activities of the Society during the past year.

Treasurer's Statement.—Mr. John Powell submitted his financial statement for the year ended July 31, 1932, as given elsewhere in this issue, and stated that some subscriptions were still outstanding.

New Members.—The nominations of members were to be duly accepted at the September meeting.

Nomination of Members.—Mr. N. L. Roberts, Kyle House, Macquarie Place, Sydney. Master Mervyn Roberts, Kyle House, Macquarie Place, Sydney. Nominated by Mr. E. H. Zeck, seconded by Mr. W. W. Froggatt. Mrs. Jean Elliott, 96 Eastern Avenue, Kensington. Nominated by Mrs. Finch, seconded by Miss D. Dobbin. Miss N. F. Jefferson, 127 Victoria Road, Woollahra. Nominated by Mrs. Lumsdaine, seconded by Miss D. Dobbin. Miss H. Holland, 6 Mount Street, North Sydney. Nominated by Miss D. Dobbin, seconded by Mrs. W. W. Froggatt. Mr. A. J. Knight, 74 Pitt Street, Sydney. Nominated by Miss D. Dobbin, seconded by Mr. W. W. Froggatt. Mr. Melbourne Ward. Nominated by Mr. W. W. Froggatt, seconded by Miss D. Dobbin.

Musical Programme.—The musical programme consisted of songs by Mr. T. Howell, Miss Joyce Froggatt, Miss Jean Garling, and Miss Rene Crossman; recitations by Miss E. Jefferys, and Mr. E. G. Bailey. After supper, Mr. A. J. Abbott recited, "The Parting Hour."

Exhibition of Specimens.—Mrs. S. A. Howell, collection of 16 varieties of jams and jellies made from native fruits and berries. Paintings of Australian flowers, opossums, kookaburras, and collection of photographs.

Mr. E. J. Bryce.—Collection of specimens of native handiwork from West Australia, York Peninsula and South America.

Mr. A. Booth.—Collection of New Zealand ferns and plants, and native flowers.

Mr. W. W. Froggatt.—Collections of beetles, moths and galls.

Mr. E. G. Bailey.—Collection of 38 varieties of cacti.

Mr. Luke Gallard.—Collections of beetles and moths.

Mr. J. Powell.—Collection of minerals and fossils from various districts.

Mr. A. E. Watson.—Collection of minerals and uncut stones from the Inverell district.

Messrs. John Sands, Ltd., per Miss A. Ratcliffe.—Pictures and paintings of Australian flowers, fruits and birds.

SEPTEMBER, 1932.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, September 6, 1932, at 7.45 p.m.

The President (Mr. W. W. Froggatt), in the chair, with about 60 members and visitors present.

Lecture.—Mr. A. W. Duncan delivered a very interesting lecture on "The Geology and Scenery of Derbyshire," illustrated with numerous lantern slides. The lecturer was accorded a hearty vote of thanks.

Excursion.—The excursion to East Hills was described by Mr. W. W. Froggatt, who commented on the numerous and beautiful blooms of acacia seen there.

Correspondence.—Letter from Linnean Society of New South Wales, asking for Vol. 8, Part 6, "Australian Naturalist." Naturalists' Club of Victoria, asking for Vol. 5, Parts 3 and 8, "Australian Naturalist." The Cairns-Tableland Publicity Association re rules and regulations of Naturalists' Society of New South Wales. Parks and Playgrounds Movement of New South Wales re meeting of executive. Gordon & Gotch, Ltd., re "Australian Naturalist." Mr. J. Hatchell Brown re membership. Parents and Citizens' Association, East Lindfield, re visit of members.

Treasurer's Statement.—The Hon. Treasurer, Mr. John Powell, tabled his monthly statement, which showed a credit balance of £18/6/2.

New Members.—Mr. N. L. Roberts, Master Mervyn Roberts, Mrs. Jean Elliott, Miss N. F. Jefferson, Miss H. Holland, Mr. Melbourne Ward, Mr. D. E. Williams (Cootamundra), and Mr. A. J. Knight were unanimously elected members of the Society.

Nomination of Members.—Mr. L. G. Vanstone, 31 George Street, Greenwich Point. Nominated by Mrs. S. A. Howell, seconded by Miss D. Dobbin. Mr. F. J. Dodd, 5 Ramsay Flats, High Street, North Sydney. Nominated by Mr. Luke Gallard, seconded by Mr. E. H. Zeck. Mr. J. Hatchell Brown, "Warrah," Willowtree, N.S.W.

Exhibition of Specimens.—Mrs. Finch: West Australian pea.

Mr. Harris.—Specimen of Pittosporum.

Miss E. Jefferys.—Specimens of *Eriostemon myoporoides* and *Corysanthes.*

Mr. J. Hawley.—An insect-eating bat of the family *Vespertilionidae.*

Mrs. S. A. Howell.—Branch of acacia, showing damage by boring larva of moth.

Mr. W. W. Froggatt stated that the winged seeds, exhibited by Mrs. Spong at the July meeting, were the seeds of the Hoop Pine of Darwin, India, Malay Peninsular and Philippines.

Mr. P. E. B. Barnett.—A froghopper, *Eurymela,* sp. (family *Jassidae*).

Mr. F. J. Dodd.—A number of butterflies captured between Newcastle and Brisbane.

Mr. Luke Gallard.—Immature form of cicada and some of the smallest species of ants he had ever collected. Weevil borers, orange-tree borers, apple-root borers, and wax scales.

OCTOBER, 1932.

The ordinary monthly meeting of the Society was held in the Assembly Hall, Department of Education, on Tuesday, October 4, 1932, at 7.45 p.m.

The President (Mr. W. W. Froggatt), in the chair, with about 56 members and visitors present.

Lecture.—Mr. J. A. Nangle, F.R.A.S., delivered a most interesting lecture, on "Recent Discoveries in Astronomy," illustrated with numerous lantern slides. The lecturer was accorded a hearty vote of thanks.

Correspondence.—Letter from Mr. C. H. Finch re excursion. From Sister M. Joseph, Wombat, forwarding specimens for identification. From Queensland Naturalists' Club, Cairns, re "Australian Naturalist" and visitors to Cairns. South Australian Naturalists' Society re Flower Show. Mr. M. E. Gray advising change of address.

Treasurer's Statement.—The Hon. Treasurer, Mr. John Powell, tabled his monthly statement, which showed a credit balance of £18/17/5.

New Members.—Mr. F. J. Dodd, Mr. L. J. Vanstone, and Mr. J. Hatchell Brown were unanimously elected members of the Society.

Nomination of Members.—Miss Nash, Riversby Flats, Ramsgate Avenue, Bondi. Nominated by Miss H. McAnene, seconded by Miss D. Dobbin.

Exhibition of Specimens.—Mr. A. E. Watson: Collection of native flowers.

Mr. Luke Gallard.—Tape worms from wallaby, diamond snake, lizard, and various birds. Specimens of the "Moth Lacewing," *Ithone fusca,* which he described.

Master J. Ludowici.—Specimen of rough opal.

Mr. W. W. Froggatt.—Specimen of Red bottle brush, *Callistemon lanceolatus*, and Ti-tree, *Melaleuca leucodendron.*

THE HON. SECRETARY'S ANNUAL REPORT OF THE NATURALISTS' SOCIETY OF NEW SOUTH WALES,

1931-1932.

The year's activities of the Naturalists' Society of New South Wales have been up to the standard of previous years, and, in spite of the depression and hard times, we have been able to carry on and maintain our membership. Our membership (including country and oversea members) is now 186.

Just before the last annual meeting our active secretary, Mr. R. A. Black, resigned on account of having accepted a position in Victoria, and the assistant secretary, with the united help of members of Council, tided the Society over the successful annual meeting, and carried on until Mr. Keith McKeown took over the duties of hon. secretary. Unfortunately, Mr. McKeown was compelled to resign the secretaryship in May, this year, owing to pressure of other business.

Early in June we had the misfortune to lose by death our old friend, Mr. G. G. Park, who had been our very capable librarian since 1929, and Mr. Ralph Houston, a life member of the Society.

We have had a fine series of lectures at our monthly meetings, illustrated by lantern slides, delivered by well-known specialists, as follows:—

September, 1931.—Mr. M. B. Welch, B.Sc., A.I.C., of the Technological Museum, on "Our Forests."

October, 1931, February, 1932, and July, 1932, were members' nights.

November, 1931.—Mr. E. C. Andrews, Government Geologist, Department of Mines, on "A Visit to Japan with the Pan-Pacific Conference."

December, 1931.—Mr. G. P. Whitley, Ichthyologist, Australian Museum, on "Sharks."

March, 1932.—Mr. R. H. Anderson, Assistant Botanist, Botanic Gardens, on "Forest Trees."

April, 1932.—Mr. E. Neville Cayley, Ornithologist and Artist, on "Life and History of our Australian Birds."

May, 1932.—Mr. W. Boardman, Assistant Zoologist, Australian Museum, on "Sea Shore Life."

June, 1932.—Mr. Ernest Bryce, of the Royal Society, on "A Trip from The Kyber Pass to Moscow through the Caucasus."

There was an average attendance of about 65 members at the monthly meetings.

The monthly excursions have been interesting and well attended. During the year we visited Cheltenham Valley, the river at Engadine, the old Rifle Range at Randwick, Eastwood, Kuring-gai and Berowra, the Botanic Gardens, Engadine, Middle Harbour Park, Northbridge, and Ball's head.

Last December we held our first Christmas gathering, which was much enjoyed by all, and members expressed a wish that this would be an annual event.

OBITUARY.

Miss Lily F. Parkes died at her home at Cremorne last September. She was born in Sydney in 1862.

She and her elder sister, Miss Anne Parkes, who predeceased her, some years ago, were active members of our Field Naturalists' Society. Both their names are on our list of member in the "Australian Naturalist," Vol. I., Part III., page 36, 1906.

Miss Lily Parkes was a well-known conchologist, and made a large collection of shells from the vicinity of Port Jackson. She presented many specimens to the Australian Museum.

Thomas G. Sloane, who died at Young on October 20th, was born in Victoria, April 30th, 1858. The writer first met him in the summer of 1882 at Mr. Charles French's cottage, in the Botanic Gardens, Melbourne. We were two young bushmen seeking information about our beetle collections. We foregathered years later when he was living in Sydney, and were fellow-workers and correspondents through the years, and every year exchanged Christmas greetings.

He was a member of the Linnean Society of New South Wales, and between the years 1888-1923 he contributed over 60 papers and monographs on the *Carabidae* and other *Coleoptera*. He was a world-wide authority on the *Carabidae* and *Cicindelidae,* described many new species, and worked out their affinities and distribution. He was a true field naturalist, always ready to help a beginner and name up his specimens.—W. W. F.

EXCURSION TO EAST HILLS.

East Hills was a new land for most of the party of 26 naturalists who journeyed there on Saturday afternoon, September 3, 1932.

A guide and a rowing boat conveyed us across the river into "Wattle Land." He led us through an underbrush of acacia bushes (*Acacia decurrens, A. longifolia, A. discolor, A. juniperina* and *A. linearis*). Large-leaved "geebungs," *Persoonia,* were plentiful, and the fine-leaved "geebungs," such different looking shrubs, that were it not for their oval fruits one would hardly believe belonged to the same genus, were numerous.

There were many humble shrubs and flowers, but only a few banksias. The larger trees were mostly "gum trees," stringybark, black-butt, scribbly gum, ironbark, and numerous "apple gums," *Angophora bakeri,* with their rough bark and fine foliage formed a marked contrast to the great, white stemmed, *Angophora lanceolata.*

We then came to a road, beyond which was a deserted area, with a tangle of blackberries, a few old pear trees coming into bloom, and tree stumps partially overgrown with young wattles—the site, years ago, of the Holdsworthy concentration camp, where prisoners of war were interned during the Great War.

We crossed the creek, bridged by three logs placed side by side, and had afternoon tea on a thick carpet of brown grass, which had evidently been burnt by the frosts of the previous month.

It was virgin land in all its beauty, and one of our most interesting outings of the year.—W. W. F.

On Saturday, September 3, 1932, 26 members of the Society set out on an excursion to East Hills. Mr. W. W. Froggatt, with a charming buttonhole of grape hyacinth and little white orchids was leader of the party.

Three-quarters of an hour's travel and we were at East Hills Station, and then a short walk through the park brought us to George's River. Here we found a guide and a rowing boat waiting for us, and soon we were ferried across to the opposite bank.

Then began a most delightful couple of miles walk; first through a wattle grove, all yellow with a wealth of golden blossom, and then on among eucalypts, banksias, geebungs, angophoras, and the hundreds of species of trees and plants which grow to make up the bush.

NATIONAL MUSEUM VICTORIA

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